JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

The New Session.

THE political programme adumbrated in the speech of His Majesty at the opening of the third session of the present Parliament last Wednesday was received with a serenity that, under other circumstances, might have been taken as a happy augury. But it was only the calm preceding the storm. The items of the programme are merely the headlines to momentous issues, involving great national and financial considerations; and a session has commenced which will be made up of a series of sharp and critical battles—not only between the Government and the Opposition, but between the former and the sections of their supporters. Of the public measures the Government propose to introduce, gas administrators will naturally, as large employers of labour, follow intently the one which proposes to make better provision for old age. The Socialist-Labour party are determined that the simple intimation made on this head in the King's Speech shall have its consummation in a concrete scheme of univeral and non-contributory pensions, with provision for the physically-unfit. In view of the condition of the national finances, and the existing heavy burdens of the rate and tax payer, there will be widespread agreement with the view of the Marquis of Lansdowne, that the present is an inopportune time for assuming so colossal a liability, and with his fear that the step is fraught with very grave results for the financial stability of the country. However profoundly favourable our feelings may be for social betterment, wisdom dictates that the whole, and not only part, of the effects of every scheme must be taken carefully into account, and consideration be also given to the question of whether the scheme has no better alternative. A subject of much discussion last session was that of the hours of labour in coal mines; and it is to be revived this session. It is an unnecessary measure. The labour returns for last year clearly show that, despite the great activity in the coal trade that continued the year through, the average time of employment in the coal mines was only five-and-a-half ordinary working days a week. The coal-owners, too, have recently called the attention of the Home Secretary to the evils involved in any such restriction as is proposed—both to the country and to the coal miners themselves. Time restriction means a permanent increase in cost; and users will have to bear the increase. From a national economic point of view, the proposal is an objectionable one. But at Westminster, national economy is clearly not a fashionable or potent factor just now.

The Labour party are anything but satisfied with being put off with old-age pensions and the limitation of hours of work in mines; and they want a larger share of the public time, as is evidenced by their protest against what they characterize as the "apparent indifference" of the Government to the question of the want of employment. His Majesty's speech also announced the intention of the Government to keep their promise to introduce a Bill to amend the system of valuation of property in England and Wales for the assessment of imperial and local charges; and if the other imposing questions do not squeeze this one from consideration, perhaps the Committee of the Gas Companies' Protection Association will, in connection with the measure, find an opportunity for urging reasons for a rational system of rating gas-works property. A measure is also promised for establishing an authority for the control and improvement of the Port and Waterway of London. In this scheme, those gas companies and gas apparatus manufacturers who use the Thames for the conveyance of material and manufactured goods will find interest. The Government have, in accordance with the threat of last session, provided a special opportunity for the House of Lords entering into a set-struggle with the ruling majority of the Lower House. The assertion promulgated by the organs of the London Progressive party, that the Local Government of London was to be thrown into the melting-pot this session, and something be moulded that would be astonishingly favourable to Progressive ascendency once more, shows no signs of materializing. The Government have outlined a heavy programme for the session; and it is clear there will be little time for anything else, however important other questions may appear to us individually or collectively as representing particular industries or other secular interests. The Private Gas Bills for the session are few in number; and their provisions have been dwelt upon in recent issues.

The Gaslight and Coke Accounts.

THE accounts of the Gaslight and Coke Company for the past half year present a sound condition of affairs. In considering them, there are three matters that make them peculiarly interesting. The first is that the half year is the one to primarily bear the brunt of the considerable rise in the price of coal; the second is that it is the half year during part of which meter-rents were re-established; and the third is that the accounts supply us with the grounds upon which the Directors were moved to make the reduction from December of 1d. in the price of gas, and on which they hope to maintain the prudence of that action. The three points all hang together. The accounts show us that coal, oil, coke, and breeze used in the manufacture of gas cost for the half year £110,299 more than in the corresponding half of 1906, and of this sum the increased receipts from coke and breeze recouped about £82,000. Yet the balance on the half-year's working is £376,575, or an increase of £22,635 compared with the corresponding period of 1906, notwithstanding that meter-rents were only charged in the last three months, and produced but £14,560. The amount available for dividend is £683,568; and after the customary obligations to the proprietors have been discharged, there will remain in hand £349,551, or £119,598 more than at this time last year. This being so, meter-rents not having yet been fully charged over a half-year's account, and gas production now being conducted on more economical lines, it is readily seen that the reduction of 1d. recently made in the price of gas was a very safe step on the part of the Board. Had the meter-rents not been re-imposed, the half-year's accounts would, the figures already quoted show, have been remarkably good. But it was a wise thing to re-establish them—putting only, in effect, ¾d. per 1000 cubic feet on the price to the consumers and almost simultaneously taking 1d. off.

There is not a word in the report about the increased cost of manufacturing material; and seeing that £110,299 additional was spent in this direction, it is certainly a feature of the half-year's working. The sum was distributed between coal, oil, and coke and breeze: Coal costing £101,040 more; oil, £3125; and coke and breeze for carburetted water gas, £6134. The large extra payment in the case of coal was not all due to the additional price, as some 22,313 tons more were carbonized. With regard to oil, 49,921 gallons less were used, and of spirit 13,705 gallons. But beyond this, and the fact that coke took its customary course of following the coal market, and produced (with breeze) some £82,000 more, the accounts have little about them calling for special attention. They are, however, highly satisfactory in their general result; and the Directors say that this condition of things has been brought about by the increased sale of gas, the improved prices of coke and breeze, and various economies in working. The last are found scattered through the revenue account; but when we look at the total amount spent on repairs and upkeep, and at the sums written off for depreciation, it is seen that the economies are not referable to these items. To coke and breeze, allusion has already been made. But as to the increase in the quantity of gas sold, that, the Directors say, is 1 per cent. on the quantity

sold during the corresponding period of 1906; but the sale of gas in the half year being 10,799,113,000 cubic feet, the 1 per cent. (which compares with 1·1 per cent. in the corresponding period of 1906) represents a considerable volume of gas. The increase in the receipts for gas amounted to £25,082. Looking at the other items of revenue, it is remarked that tar produced some £4000 less than in the corresponding half year; ammoniacal liquor and sulphate of ammonia returned about the same; coke yielded £77,277 more, and breeze £5000. Therefore, under the head of "residuals," coke and breeze are the only ones to have done conspicuously well. Three months' meter-rents contribute £14,560 to the half-year's revenue; and rental of stoves furnished £2122 additional. In connection with a change recently explained by the Governor (Mr. Corbet Woodall), an item "rental of "fittings, £59,224," now appears; but to set against this is a new charge on the other side of the account.

But the final outcome of the working is that, notwithstanding the heavier costs of the half year, which made the expenditure greater by £151,535, the revenue was £179,738 more; and thus the balance on revenue account (£589,413) is £28,203 better than for the corresponding period of 1906. Considering the troublesome and abnormal times, much satisfaction will be found in these accounts by the proprietors; for certainly when the coal contracts were being negotiated nine months ago, anyone would have been of a very sanguine disposition who then prognosticated that the Company would come out of the succeeding half year with such a clean and pleasing sheet as that which the Directors are submitting to the proprietors on Friday.

Affairs of the South Metropolitan Company.

On previous occasions, the South Metropolitan Gas Company have been referred to as the most democratic Company of which we know. We are reminded of this by an omission in the report. Among the proprietors, there are a greater number of men who are not keen arithmeticians than in any other similar gas undertaking; and on behalf of those proprietors, who are as earnestly desirous of knowing as early as possible the exact effect of the half-year's operations as those with larger holdings and more experience at making calculations on their own behalf, we would suggest that half-a-dozen lines in the report of the Directors should invariably be devoted to stating the general effect of the financial result—whether the balance of profit is sufficient to meet the dividend, the sum the dividend will require, and the amount (if any) that will be left in hand with which to commence the fresh half-year's accounts. Until Sir George Livesey makes the statement at the meeting of the Company on the 12th inst., a great many of the proprietors will have some difficulty in taking the £6,429,895 of ordinary capital in statement No. 1, and multiplying it by £5 6s. 8d. per cent. (the full dividend under the sliding-scale), to see whether the £162,999 standing to the credit of the net revenue account, will be sufficient to pay that dividend, and, if it will be, how much will be appropriated and how much will remain in hand.

With this little criticism, or rather suggestion, regarding, in the special circumstances of the Company, a point of incompleteness, it may be said at once that the half-year's accounts (which are highly satisfactory with gas at only 2s. 3d. per 1000 cubic feet) show how absolutely necessary was the advance of the price by the odd 3d. at the beginning of the half year. Compared with the corresponding period of 1906, the increased cost of coal was £83,008. But there were 14,500 tons more carbonized; and deducting the cost of this quantity from the £83,008 increase, it is seen that the 3d. addition to the price of gas barely covered the additional cost. But there are the excellent improvements in the receipts for residuals to be brought into account; and it may be taken that a large part of the £28,329 increase in the receipts for coke and £3545 for breeze is due to the better values obtaining owing to the higher price of coal. Sulphate of ammonia likewise gave an increase of £10,938 in income; but tar presented practically the same total return as a year ago. Little use, however, would be served in making deductions for residuals to show how much of the 3d. increase in the price of gas the Company would have required under the disclosures of the half-year's working if the higher price of coke had been the only abnormality with which the Directors had had to contend. All that the 3d. gave, the Company really need. Separate items of expenditure in a big concern of this kind will, of course, vacillate considerably half year by half year; but there is one item in the accounts—law charges, £10,450—of which all but £800 is the Company's share of the cost of the big rating appeal that aroused so much interest in gas and rating circles last year. To have fought in full belief of the possession of right, and to have lost with the law definitely against one, is a position to which one could resignedly bow; but to have fought, and to have had a lower Court against one, with no means of getting the judgment set aside, a heavy bill of costs to be borne, and then subsequently to see, in another case, the main point in dispute decided by a Higher Court, precisely in favour of one's own claim, is sufficient to make one sore, and to question whether law and justice are always synonymous terms. That is the position of the South Metropolitan Company in this vexatious rating appeal; and naturally the cup of bitterness of the Directors over the matter is full. They can only share in the gratification that the question of prepayment meters, stoves, and fittings is at length settled favourably to gas companies; but they have to bear a big bill of costs, and cannot, at present, obtain any redress.

Looking generally down the items of expenditure in the revenue account, in addition to the extra cost of coal and the heavy legal expenses, more has been spent on repairs and renewals under both manufacture and distribution; and an item also appears—"Repairing and renewal of gas-fittings, "£6197"—which had not separate existence in the accounts a year ago. The charge for public lamps has gone up by £1781. The item is not so much of importance as of interest; for when we look at the figures under "number of "public lamps" in a later statement, it is seen that out of the 23,480 public gas-lamps in the Company's district, only fifteen are now of the flat-flame order, whereas a year ago there were 766, and moreover the total number of lamps has since been increased by some 350. Thus there are 1100 more incandescent street-lamps in the Company's area than a year ago. We shall look for the odd 16 or so being effaced during the next six months. The increase in the price of gas has brought down the charge on behalf of co-partnership from £18,000 in the corresponding half year to £13,000 for the past. A startling item is "Stolen from 4143 slot "meters broken open, £465," which represents an average of about 2s. 3d. per meter. Is this 4143 an accumulation over a period longer than the half year, or for the half year alone? If the latter, it is a serious state of affairs; and the amount stolen does not represent the cost to the Company. It means that 4143 slot meters, having suffered violence, had to be disconnected, removed, repaired, and replaced. We have never seen a more effective argument than the few words constituting this single item in these accounts for the adoption of stronger money-boxes for prepayment meters as and when possible. It proves the old money-box to have been a mistake. However, the total expenditure on revenue account amounted to £828,631—an increase of £117,522. The total receipts (including an increase of £78,452 for gas and the higher income from residuals already referred to) amounted to £1,025,004—an increase of £122,668. Therefore the increased revenue balanced the increased expenditure, and gave £5147 besides to swell the balance—£196,373—transferred to the net revenue account.

Considering the wet and cheerless character of the half year, the percentage increases in consumption of the two largest London Companies hardly come up to expectation; but in volume they of course represent a substantial amount of gas. The South Metropolitan Company had an increase of 1·36 per cent. But the past half-year's total sale was 6,113,750,000 cubic feet; so that the volume of increase was about 83 millions. As the volume of business done year by year increases, so the size of the percentage figure of increase is bound to automatically decrease though the volume of increase may not. But the report points out, that, considering all the circumstances, the 1·36 per cent. increase is satisfactory; and attention is directed to the development in the use of the economizing inverted burner. The evolution of economy in gas consumption, combined with higher efficiency, is really one of the most remarkable phases in the whole history of gas supply. From the flat-flame burner, using about 6 cubic feet of gas, and giving 10 to 12 candle power, to the bijou inverted incandescent burner, giving from 20 to 25 candles for a consumption of 1 to 1½ cubic feet, is an extraordinary stride. The handiness, the efficiency, the economy, and the decorative capacity of bijou burners, are being appreciated by consumers more and more every day. There is no doubt that a decided movement has set in on the

part of consumers to secure the good qualities of these small burners. Just as consumers displaced in large measure flat-flame burners by the 3 to 4 cubic feet vertical incandescent burner, so they are displacing the vertical incandescents by the ordinary inverteds, and especially by the 1 cubic foot (or rather more) bijou burner. We know of a case where the change effected such a drop in consumption that the meter reader returned last quarter to ascertain whether he had not made a mistake. It is a question whether in the gas industry the vertical incandescent burner has not caused us to look upon too high illuminating power units as the proper thing in house lighting; but the consumers themselves are setting us right in this matter by their voluntary adoption of the bijou inverted light, which gives them a big command over the division and subdivision of illumination, and over consumption. The trend of domestic gas illumination being in this direction, the magnitude of the rate of increase in consumption of gas is bound, for this reason alone, to dwindle. Changes in condition account for many things; but we can nowadays afford to look with equanimity upon such changes as this—more especially seeing that lighting is not our only line of business in gas at the top price.

Our Coal Supplies—and Others'.

It does us all good at times to see ourselves as others see us; and the same observation applies equally to our belongings as to our persons. It is also a truism, but one ever worth bearing in mind, to say that we do not properly value things until we have lost them. These two commonplaces of thought arise in our mind after reading the address (which is summarized in another column) of the President of the French Society of Civil Engineers. M. Reumaux, being a coal mining expert, naturally dealt with coal in general and the Pas de Calais collieries in particular. Throughout his interesting discourse, there seems to run a sad tone of resigned, but envious, disappointment and regret that the coal wealth of La Belle France is not sufficient for her own needs, and falls so far short of the coal resources of other countries, especially England. Being the favoured nation, we would bid M. Reumaux to cheer up, and remember that man does not live by bread alone—nor nations by coal. Neither does a nation, any more than a man, live solely unto itself. Any civilized nation cannot be self-contained, like a modern flat. Interchange of commodities is the essence of the commerce of to-day. So, as we have plenty of coal and to spare, we can make up France's deficiency in this respect, and in return willingly accept her own choice productions. M. Reumaux himself almost seems to realize this; for at the conclusion of his address, although still regretting that the mineral wealth of France is not equal to England's or Germany's, he yet pays a tribute to French activity in art and science, to its agricultural population, to the tastefulness of its workers, and the finish of its manufactures.

We ourselves, at the same time, should not forget the great advantages which we enjoy as a nation from holding such magnificent mineral wealth as we do. We are not among those who would attribute all our national virtues and commercial supremacy merely to our possession of the "black diamond." But we do believe in the benefit of an occasional reminder of the bounteousness of Nature's gifts to us, even if it only be to prevent our having too good an opinion of ourselves. We welcome it also because it serves to give us pause to inquire whether we are really using aright these beneficent gifts. Here, again, we are not among those who would at once nationalize our coal resources, or who would establish great central gas-works at the collieries, and pipe heat, light, and power to all parts of the country. We would be practical in our progress, and progressive in our practice. It is for this reason we would not unduly penalize the man who uses a poker and enjoys a coal-fire. But we welcome every legitimate effort made toward the most economical and scientific means of obtaining heat for our houses. Believing, as we do, that up to the present the best, most convenient, and most thrifty—in a scientific, if not in a financial, sense—method of effecting this is by the employment of gaseous fuel, we advocate the utmost cheapness of production of coal gas, and the greatest freedom from useless restrictions in the conditions of its supply. We do not adopt this attitude in any spirit of selfish gain; for as gas companies have learnt that their best interests lie in generous treatment of their consumers, so the gas industry collectively can also realize and act upon what is for the country's good as a whole. While, then, we are profoundly thankful for the great natural fuel resources of our country, at the same time we are anxious that, step by step, and in keeping with practicable considerations, everything possible should be done to utilize those resources along the most scientific lines of gaseous heating. Thus we should be acting up to the memorable words of the incorporating Charter of Civil Engineering in this country—namely, practising "the art of directing the great sources of "power in Nature for the use and convenience of man." If incidentally, also, cleaner cities and brighter skies were to result, the general gain to the community in health, in character, and in wealth would be all the greater.

A Suggested Gas Manufacturing Combination: Its Economies and Product.

It is to-day a self-evident truth that a cheap gas of respectable calorific value is an essential both in the interests of the public and of the gas industry. But a perverse legislature, unappreciative of the necessities, stands in the way of discarding illuminating power as the test of quality between consumer and purveyor; and between the legislature and the further considerable cheapening of the cost of gas to the consumer stand the present methods of manufacture, which will have to be radically changed to realize the ultimate possible point in the matter of cheap supply. It is to this latter aspect of the question that attention is directed to-day. Most students of the trend of gas manufacture agree that to produce the gas of the future will necessitate the greater application of water-gas manufacture; and that the association of the two systems—the coal and the water gas—will have to be on more economical lines than their present independent existence. Those who have taken more than a superficial interest in the efforts of inventors to realize an economical manufacturing combination of coal and water gas have seen that those efforts have mostly taken shape in the provision of a producer with a central vertical retort for the production of coal gas. Regarding such a combination critically, it is difficult to see that it can produce any real advantage, or that its one constituent can give any influential aid to the other. Of course, the fundamental idea of the combination is the conservation and utilization of heat, by its direct employment for a dual purpose. But it is questionable whether the heat losses occasioned by the method of working such a form of construction would not more than counterbalance any gain. To all intents and purposes, the generator and the retort in such a combination have nothing in common, save that the one is built within the other. They have to be charged and operated separately. The dumping of cold coke into the one and the dumping of cold coal into the other, and the blowing up and the cooling down of the producer during gas making, must expose the coal-gas making chamber to violently variable temperatures; and such rapid revolutions in condition are the exact opposite of what is desirable for the best result from the carbonization of coal. From such premises, one may deduct both heat and product losses in such a combination, which in itself also suggests complicated structure and complicated working, with difficulties from tar and other matters.

In another part of this issue, Mr. J. T. Westcott, of the Economical Gas Apparatus Construction Company, presents the gas industry with the drawings of a combination water-gas and coal-gas system which he has designed, and which, so far as memory serves, is a complete departure from any other water-gas and coal-gas combination that has, through patent specification or otherwise, come under our notice. In the design of the plant, we can imagine that he had a threefold object—in the first place, to avoid, in large measure the losses to which reference has been made, as being inherent in other proposed combinations; in the second place, to produce a complete cycle of operations, in which the two systems of manufacture render such reciprocal aid that a considerable gas yield is attained from a ton of coal, with a heat value in the resulting volume of gas greater than would be attained by using the same ton of coal in gas-retorts and the coke in a water-gas plant; and in the third place, to effect a saving in the fuel account. The system suffers from the fact that it has not yet received practical application. But all systems of the kind have a like beginning; and this one commends itself and promises a feasible development on the fact alone that it emanates from a brain tutored by many years' experience in the construction and

working of carbonizing plants for gas production. Mr. Westcott uses a water-gas generator, with a coal-gas inclined retort connected at the top. The generator, in the manner described in the notes accompanying the drawings, supplies the needful gases to heat up the inclined retort; the production of water gas proceeds in the ordinary manner, but the gas passes up through the inclined retort and mixes with the coal gas; and the inclined retort is charged from a hopper above—the spent charges being fed direct into the generator for water-gas manufacture. It is thus seen that, if what looks decidedly simple upon paper is workable in practice (and, at any rate, there appears to be no insurmountable engineering difficulties about it), after working has been started, there will be no dumping of cold fuel into the generator, no quenching of the coke from the inclined retort will be required, or its reheating in the generator, because the coke will be ejected direct from the inclined retort into the generator in its hot state; and in this way the fuel saving would possibly be represented by at least 20 per cent. In the working, a revolving grate at the bottom of the generator plays an important part; and that grate, being built up of sections, can be readily maintained in good working condition.

From the notes accompanying the drawings, it will be observed the claim is made that, in this process, everything in the coal "excepting the ammoniacal liquor and the ash" is converted into gas. No one has before opened up such a vista to gas result (without using oil or any other enrichment) as Mr. Westcott has now done in this project of his. A production of 45,750 cubic feet of gas of a gross calorific value of 407 B.Th.U., and an illuminating power of 6·65 candles, is something worth pondering over. The volume of gas is very acceptable, the calorific value is not bad, the illuminating power is the death blow at the present time in this country unless the gas be merely used as a diluent; and it may appeal to some gas engineers as being preferable for this purpose to straight water gas. There has also to be set against the high production of gas the sacrifices made in securing it. Mr. Westcott has not gone to the length yet of working out a balance-sheet on a hypothetical case. It would increase interest in the matter if he would do so. Nothing is suggested as to probable working costs; and as to revenue, all income from bye-products other than ammoniacal liquor is given up. On the other hand, it is estimated that the calorific value of the large volume of gas produced from a ton of coal will exceed by about 3 million B.Th.U. that of the gas produced by dealing with the same ton of coal by the ordinary methods of coal and water gas making. Would the commercial value of this increased volume of gas (a greatly reduced price per 1000 cubic feet would be paid for it) and the increased calorific value in that volume compensate for the sacrifices made to secure them? These are only a few considerations that arise on reading the notes and studying the drawings. There are several others; but the few may induce Mr. Westcott (who has, we believe, made a comprehensive study of the suggested combination) to enter into the matter with greater detail. The suggestion is directed to the goal upon which all carbonizers with gas as their staple product have intently set their eyes; that is to say, the means of obtaining—consistent with the highest economy and profit to both gas makers and users—the largest production of serviceable gas from a ton of coal.

The South Metropolitan Assessment Appeal.

It will be remembered that after the decision was given in the early part of last year in the unsuccessful appeal to Quarter Sessions by the South Metropolitan Gas Company against certain of their assessments, the Company obtained a rule calling upon the Justices of the County of London to show cause why their judgment should not be brought up to be quashed. The ground of this action was that one of the Justices who heard the appeals—Mr. Willoughby—from the position he occupied, might reasonably be suspected of bias. Mr. Willoughby was a member of the Holborn Borough Council; and it was pointed out that it was to the interest of one part of London to see that the rate in another part was kept up. Then, again, it was urged that, as Chairman of the Holborn Assessment Committee, Mr. Willoughby might have an unconscious bias in the direction of the interests of his constituency; but it was stated quite clearly that no personal accusation was made against him. After the rule had been granted, the matter came before Mr. Justice Bray and Mr. Justice Lawrence last July; and it was by them discharged. From this decision the Company appealed; but on the case coming before Lords Justices Vaughan Williams, Farwell, and Kennedy in the Court of Appeal last week, they met with no greater success than they had done previously—judgment being delivered without the Counsel for the respondents having been even called upon. In our "Legal Intelligence" to-day will be found the remarks made by Lord Justice Vaughan Williams (which were concurred in by Lords Justices Farwell and Kennedy) in dismissing the appeal. After admitting that the case was of considerable importance, he said everybody agreed that the whole basis of decisions on such points—with reference alike to pecuniary interests and to bias—was a question as to the effect likely to be produced upon the minds of the public, or upon the minds of a class of the public, as to the fairness of the administration of justice if a justice under the circumstances proved in the particular case were allowed to sit and take part in the decision. Thus it was plain that very often there would arise a question of fact which was difficult to decide, because it was really a question of degree, which had to be decided in every case. The affidavits that had come before the Court in the present case, did not show that Mr. Willoughby, as Chairman of the Holborn Assessment Committee, had ever dealt with the same questions as those raised on the appeal of the South Metropolitan Company to Quarter Sessions; but his Lordship said he could conceive a case where the facts might render it most improper for the Chairman of an Assessment Committee, having regard to matters that had come before him sitting as a member of Quarter Sessions, to hear appeals raising identically the same questions. A Magistrate must not sit under circumstances which would raise a reasonable suspicion in the minds of the public, or a class of the public.

Coal Miners' Eight Hours Bill.

We would draw the attention of readers to a letter from Sir George Livesey which appears among the correspondence in to-day's issue, on the subject of the Coal Miners' Eight Hours Bill, with regard to which, it will be recalled, a deputation was recently received by the Home Secretary, who, in the course of the proceedings, expressed surprise that the users of coal had not moved in this matter, and, Sir George says, gave the impression that any representations on their part would not be unwelcome. Other large consumers have taken alarm at the expected increased cost of coal should the Bill become law; and the letter points out that the gas industry is also moving through the Gas Companies' Protection Association—a special meeting of which body has been called for Thursday next to consider the matter. Sir George remarks that, as the notices for this meeting are only sent to the members, he thinks it well to invite the co-operation of all gas companies "in the effort to prevent a large permanent increase in the cost of coal which all the authorities believe will be the result of the Eight Hours Bills should it become an Act of Parliament;" and he adds that not only the gas companies, but the corporations supplying gas may well take action in this matter, either in conjunction with the companies or independently. It is, he states, expected that the meeting on Thursday will decide on a memorial to the Home Secretary, and ask him to receive a deputation, and that other trades and interests will do likewise. Sir George concludes his letter with a call to arms which should not be made in vain—"Let not the gas industry be backward in the work."

Sir Oliver Lodge on the Mitigation of Fog.

The recent visitation of fog, with its attendant inconveniences, has afforded Sir Oliver Lodge an opportunity of offering once more a few observations on the subject; and he selected the Engineering Supplement to "The Times" as the medium for bringing them under the notice of the public. He opened his communication by pointing out that there are three methods of dealing with fog—one being to take steps not to assist artificially in its formation, another to oppose the natural causes which lead to it, and the third to disperse it when formed. As the last might be somewhat difficult, Sir Oliver considers the first is by far the best and most economical plan, and in respect of town fogs is quite the most hopeful and feasible. A fog which consists solely of condensed aqueous vapour ought, he says, to be evaporated and cleared up by the general warmth of a great city. But town fog is something more than aqueous vapour, inasmuch as it carries sulphurous and tarry compounds and other products of

imperfect combustion usually attending the destructive distillation of coal. The trouble might be to a large extent mitigated by the use of improved fireplaces and boiler furnaces, and the adoption of a more intelligent system of stoking than that now in vogue. But while these would make for more perfect combustion, there would still be some impurities—notably sulphur—fouling the air. Therefore, to avoid generating fog where it need not otherwise exist, and intensifying it whenever a natural tendency prevails, it is necessary to avoid the emission not only of solid particles, but also of sulphur oxides. Hence, "the real and ultimate remedy is not to allow the importation of coal into a large town, but to have it converted into partially purified non-illuminating gas outside, and forced along immense mains to the distant towns, just as water is at present supplied." Our readers will recognize that this is but a repetition of the old proposal, to pipe into towns a supply of gas from the pit's mouth, which has been brought forward at various times since the idea was first broached by the late Sir William Siemens. As solid particles resulting from the combustion of coal add to the fog trouble, it is obvious that the more extended use of gaseous fuel would do much to mitigate it. But whether this would be facilitated by the carrying out of a gigantic scheme for piping gas from the pit's mouth is open to question. We have already a supply of gas at our doors. What is required is to enable its purveyors to sell it at such a figure as to allow of its more general employment in substitution for coal as a heating agent. This could be effected by legislation and administration, without requiring the enormous expenditure which such a scheme as that suggested by Sir Oliver Lodge would involve.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 307.)

THE cheerful feeling predominant in the Stock Exchange which was mentioned in our last issue was stubbornly maintained in the week just closed, in spite of one or two awkwardly weak spots. There seemed to be a general determination that things ought to be good, and to make them so. After a quiet opening on Monday, the advance began, and activity developed. The gilt-edged were well to the front, and Consols rose about ¾. Business on Tuesday fell quieter, in view of it being account week. But Wednesday would not be denied, and prices went off again at a gallop—Consols gaining ⅜. On Thursday, after some hesitation as if waiting for a lead, the course continued favourable. Then on Friday supervened the usual profit-taking, which flattened things down a bit; and on Saturday stocks were moderately firm without any strongly-marked feature. In the Money Market, there was a good, steady demand for the Stock Exchange settlement, and for the end of the month, at firm rates; but discount rates inclined to be easier. In the Gas Market, the week has been full of interest; the chief feature being the highly favourable impression created by the accounts of the Gaslight and Coke Company. The fortunes of the premier undertaking in the gas industry always exercise an influence upon the Market in general, without reflection that special conditions affecting one concern may be wholly inapplicable to others. The industry is strong and healthy; and with the assured prospect of cheaper coal for this year's contracts, the outlook is satisfactory. In Gaslight and Coke issues, there was considerable dealing in the ordinary, which, from 98¼ on Monday, touched par on Thursday, and 100¼ on Saturday—a rise of 1½. In the secured issues, the preference was done at 105⅛ to 107⅛ (both it and the maximum rising 1), and the debenture at 82½ and 84. South Metropolitan was strong and quiet, and changed hands at from 125 to 127—a rise of 1½. The debenture marked 82¾. Commercials were quite neglected. In the Suburban and Provincial group, Alliance and Dublin old was done at 19⅝ and 19 1/16, ditto new at 14¼ and 14⅜, ditto debenture at 98¾ and 99, Bromley "B" at 89, South Suburban at 120 and 120½, and ditto debenture at 124. British advanced ½, without business done. In the Continental Companies, Imperial was active and firm, changing hands at from 180½ to 183—a rise of 2. Union advanced a point, with business done at 110; and European fully-paid was done at 22 *ex div.* Among the undertakings of the remoter world, Bombay new changed hands at 4⅝, Buenos Ayres at from 11¼ to 11⅜ (a rise of ⅛), Melbourne 5 per cent. at 101½ (a rise of 1), Primitiva ordinary at from 6 15/16 to 7, ditto preference at from 4 15/16 to 5 3/32, ditto debenture at 93½ and 94, River Plate at from 13 1/16 to 13⅜, and San Paulo at 13⅜.

The Midland Junior Gas Association will meet next Saturday afternoon, at the City of Birmingham Technical School, when two papers will be read. Mr. R. S. Ramsden, of Burton-upon-Trent, will give a "Few Notes on a Plant for Concentrating Ammoniacal Liquor;" and Mr. H. E. Temple, of Nechells, will deal with the "Working of a Carburetted Water-Gas Plant."

GASLIGHT AND COKE COMPANY'S REPORT.

THE following is the report on the working of the Company during the six months ending the 31st of December last, which, with the accounts [see p. 303], will be submitted to the proprietors on Friday.

The accounts for the past half year show that, after providing for fixed charges, setting aside £10,000 for the half year towards the redemption fund (in accordance with the provisions of the Company's Act of 1903), and carrying £10,000 to the insurance fund, there remains a balance of £376,575 13s. 6d. The amount brought from the previous half year being £306,992 6s. 10d., there is a total sum available for distribution of £683,568 0s. 4d., out of which the Directors recommend a dividend on the ordinary stock at the rate of £4 8s. per cent. per annum, which will absorb £334,016 19s. 7d., and leave the sum of £349,551 0s. 9d. to be carried forward to the credit of the current half year.

The sales of gas for the half year show an increase of 1 per cent. over those for the corresponding period of 1906; the increase for the year being nearly 2¼ per cent. There has been an addition during the half year of 14,736 consumers, and an increase of 19,077 in the number of gas-stoves sold and let on hire. The satisfactory result of the past half-year's working has been brought about by the increased sale of gas, improved prices for coke and breeze, and various economies in working.

As reported at the last general meeting, the Company, with the approval of the London County Council, have reintroduced the charge for meter-rent which was discontinued in 1895. The revenue to be derived from this source is estimated at about £60,000 per annum; and this, taken in conjunction with the general position of the Company's affairs, has enabled the Directors to announce a reduction of 1d. per 1000 cubic feet in the price of gas, as from the end of December last.

There will be several Bills before Parliament which may affect the Company; and these will be carefully watched with a view to protecting the proprietors' interests.

The Court of Directors have been furnished by the several engineers of the manufacturing and distribution departments respectively with the usual certificates that all the Company's plant has been maintained in thorough efficiency.

SOUTH METROPOLITAN GAS COMPANY.

Half-Yearly Report.

THE following is the report of the Directors of this Company for the half year ended the 31st of December, which, with the accounts (see p. 304), will be presented to the proprietors at the ordinary half-yearly meeting on the 12th inst.

There is an increase of 1·36 per cent. of gas sold over the corresponding half year, which is small in comparison with the increases of a few years ago; but, considering the circumstances, it is satisfactory. The chief cause of the small rate of increase in consumption is the improvement in the inverted form of the incandescent mantle burner and its growing use. When one light burning (say) from 2 to 3 feet of gas per hour lights a room much better than two or three flat-flame burners of the old type burning 10 or 12 feet an hour, the matter for surprise is that there is not a considerable decrease of consumption. It must always be remembered that the incandescent mantle makes gas by far the cheapest artificial light; and it can be left to impartial observers to say whether it is not also the best.

The result of the half-year's working shows the full effect of the great advance in the price of coal, somewhat intensified by the uncertainty of what might happen in the winter, such as a prolonged frost, labour troubles—not our own, happily—and other contingencies, which necessitated the accumulation of a stock of coal much larger than usual in the summer months; thus considerably adding to the expenditure of the half year.

There is also the item of £10,449 17s. 4d. for law charges, of which all but £800 is the Company's share of the cost of the appeal against the rating assessments. The main question in dispute was whether meters, stoves, and fittings supplied under the penny-in-the-slot system were rateable. The existing law is that meters, stoves, &c., supplied by the Company at rent to the ordinary consumers are not rateable; but the rating authorities forced this appeal on the Company by the contention that the first-named should be included in the assessment. The result of the Company's appeal was indecisive; but happily the point has since been definitely settled in the Ipswich case by the Divisional Court, consisting of Justices Channell, Bray, and Sutton, who, without calling on the Counsel appearing for the Gas Companies, gave a unanimous judgment against the contention of the rating authorities.

The extra cost of coal and the rates, including the above-mentioned exceptional expenses, were the reasons both for the increase in the price of gas and for that increase being maintained. This Company's policy has been to supply gas at the lowest possible price; and, consequently, at times like the present there is no accumulation of surplus profits, and no margin in the price charged to meet these heavy increases in expenditure. Had the

price of gas been even 2d. higher, there would have been a very large surplus brought forward; but had that been the case, the consumers would have been paying during the three preceding years over £100,000 a year more for their gas. The consumers evidently understand the position, for they made no complaints of the advance; and the Directors take this opportunity to assure them that the price shall be reduced as soon as possible.

The receipts for products, excepting tar, which only realizes its fuel value, show a satisfactory increase; but, on the other side, the expenses of gas manufacture and distribution are considerably heavier than the previous year. The net result, however, enables the Directors to recommend the full dividend payable under the sliding-scale—at the rate of £5 6s. 8d. per cent. per annum.

With great regret, your Directors refer to the loss by death of their late friend and loyal colleague, Mr. Simpson Rostron, whereby the Company have lost the services of a very able and devoted Director, who had earnestly and energetically served the Company for nearly thirty years—by far the most eventful and anxious period in the history of gas supply—doing his best, justly and considerately, to promote the interests of consumers, shareholders, and employees. The vacancy will have to be filled by the proprietors at the meeting. The only candidate is Mr. Frank Bush, who has been Secretary since 1882. The Directors believe that it will be to the advantage of the Company that he should join the Board; but the election in the case of this Company rests with the proprietors. In the event of the election of Mr. Bush, the Directors will select as the new Secretary Mr. F. M'Leod, a member of the staff for thirty-three years, who has proved himself a thoroughly trustworthy and capable officer. It will be for the proprietors to fix the amount of his salary.

There is another change on the Board. Mr. J. A. Butcher, who was elected as a Workman-Director in 1898, and has been three times re-elected by the workmen shareholders, has retired from the Company's service, and consequently from the Board. He was a true and loyal colleague, and a very useful Director, whose retirement is a matter of regret to all the Directors. The workmen shareholders have elected in his place Mr. H. T. Manley, an engine driver, a faithful and greatly respected servant of the Company. This development—the crown or topstone of co-partnership—has proved equally satisfactory with all the rest of the system, which is the solution, and the only one, of the Capital and Labour question. The employees suffer with shareholders and consumers by the increase of price; but there is no suggestion of dissatisfaction in any quarter.

Two Directors (Mr. John Ewart and Mr. John Mews) and one Auditor (Mr. G. M. Footner) go out of office by rotation. They are all eligible for re-election, and offer themselves accordingly.

SOME FRENCH INVENTIONS.

Mantles and Methane.

THERE has not been very long to wait for some development in respect to the somewhat mysterious looking registration which was noticed in last week's "JOURNAL" under the title of "The Universal Gas Methane and 'Buisson Hella' Company, Limited;" for on Thursday last there appeared in certain of the London daily papers a copy of the prospectus, which contained at any rate some details with regard to the financial aspect of the proposals, though in other respects it was not calculated to satisfy any curiosity on the matter that may have been aroused. Inasmuch as the statement appeared at its head that the prospectus was published "for public information only," there may perhaps have been a little disappointment experienced by those who perused it at the lack of definite particulars with regard to just what patented inventions have been acquired, or are proposed to be acquired. But this is, we must hope, an omission which will in due course be made good.

The publication of the prospectus is, however, not the only development that has taken place; for a letter appears in our "Correspondence" columns to-day which, while introducing complications in one respect, makes the definite statement that the inventors of the process known in France as the "Buisson Hella" are Messrs. Michaud and Delasson. That being so, readers of the "JOURNAL" will not be altogether unacquainted with the system, inasmuch as they have already had the opportunity of studying illustrated references to the patents. The first of these was in our issue dated Oct. 17, 1905 (p. 181), when there appeared an abstract of patent No. 27,707 of 1904, for an "Indestructible filament for gas and electric lamps for lighting and heating purposes." This invention was for the manufacture of a refractory and indestructible filament obtained by the fusion of magnesia, silica, lime, or alumina, made of any desired shape, and designed to be brought to incandescence either by a gas-burner or by the passage of an electric current. It was stated that the light produced by the incandescence of these filaments could be variously coloured by adding different metallic oxides—particularly oxide of chrome—to the material employed. The second reference to the matter appeared as recently as Nov. 5 last year (p. 415), when numerous illustrations were given of the application of the filaments, showing that they could be fixed in various different ways to suit upright and inverted burners, as well as radiators. It was stated that the filaments intended for gas consisted of "alumina, magnesia, silica, or lime, melted and employed together or separately, with the previous addition of thorium, cerium, or any other of the oxides of the rare earths;" the substances selected being agglomerated with soft soap. An example given by the patentees (though for the bodies named might be substituted one of the others enumerated) was: "Thorium, 99 parts; cerium, 1 part; with traces of chrome. Of this mixture, 80 parts by weight are combined with 20 parts of pure aluminium, and then bound together with soft soap," and fused at 3000° C. It is, however, asserted that the Company have taken over another patent by M. Laigle (but not yet published), which is claimed to be an improvement on the invention of Messrs. Michaud and Delasson.

But to return to the letter published to-day, it will be seen that the object of this is not to furnish the names of the inventors of the process concerned, but to state that Messrs. Michaud and Delasson, the inventors and proprietors of the "Buisson Hella" system of lighting and heating, for England and elsewhere (except France), "have not sold, or entered into any agreement for the sale of, any of the patents or patent rights, nor have they granted any option for purchase to anyone." Under these circumstances, it would seem that the need for further information on the part of the Company becomes an urgent one. Pending the clearing up of this very definite declaration on behalf of Messrs. Michaud and Delasson, we may be permitted to turn attention for a moment to the point which is dealt with in the prospectus with some degree of explicitness.

The capital is fixed at the good round sum of £600,000, divided into 300,000 7 per cent. non-cumulative preference shares of £1 each, which are stated to be preferential both as to capital and dividend, and 600,000 ordinary shares of 10s. each. The unusual conditions attaching to the preference shares (which alone are offered for subscription) are, one would imagine, hardly such as to commend them to the majority of investors; for when they have received total dividends of 100 per cent., the preferential 7 per cent. dividend is to cease, "and the holders of such preference and ordinary shares shall thereafter be entitled to distribution among them of the profits which the Company shall determine to distribute in the following proportions—namely, 20 per cent. thereof among the preference shareholders, and 80 per cent. thereof among the ordinary shareholders." The purchase price of the patents, about which so little information is vouchsafed in the prospectus, payable to the vendors (the Mining and Industrial Corporation, Limited) is £480,000—in cash or shares, or partly cash and partly shares, at the option of the Company, who have also to pay the inventors of the methane gas system 20 per cent. of the net profits earned by the Company on the exploitation of the invention, and on the re-sale of the same to any other Company or otherwise. In this connection, however, it is only fair to point out that in the prospectus "no profit has been estimated from the methane gas; but when the various processes are complete, it is expected that considerable sums can be obtained by the Company from the granting of licences for its use." As to the mantle, the profits to be earned "have been estimated to produce a sufficient sum to pay a 7 per cent. dividend on both the preference and ordinary shares, and leave a residue for further dividend." Persons who contemplate investing their money on the strength of the prospectus will perforce have to content themselves with these estimates—having no basis furnished upon which they can make any calculations of their own.

The prospectus states that the minimum upon which the Directors will proceed to allotment is the subscription of 100,000 of the said preference shares, which subscription at par has been guaranteed by the Banco Franco-Espanol—a bank whose status and connections are inquired about in the course of a lengthy article (remarkable for its candour) which appeared last Friday in the "Financier." Referring to the meagreness of the information contained in the prospectus, our contemporary says "the reticence of the promoters may be discreet; but it behoves investors to be correspondingly prudent." This may be strong criticism; but it is impossible to deny that the Company have brought it upon themselves by withholding all particulars which would enable the public to form an idea of the commercial prospects of the undertaking.

In writing thus, it will, of course, be quite understood that any criticism made is with reference to the prospectus and the financial proposals, and not at all in connection with Messrs. Michaud and Delasson's invention. Gas people in this country will, we are assured, in due time have every opportunity of satisfying themselves as to the value of their process; and meanwhile it may be remarked that excellent results have been shown in tests carried out in France.

In conclusion, it may be stated that the "gas methane" system referred to in the prospectus is the invention of M. Sabatier, which was fully described and illustrated in the "JOURNALS" for Dec. 26, 1905 (p. 896), and Jan. 30, 1906 (p. 290).

Joint Junior Association Council Meeting.—A Joint Council meeting of the Junior Gas Associations has been arranged to take place in Birmingham at noon next Saturday, All the Associations (including the two Scottish ones) will, we are pleased to learn, be represented by two members each—generally the President and Secretary—and from such a conference some lasting good should certainly result. The closest possible co-operation between the Associations can hardly fail to be of material advantage; and we shall hope to see such conferences as the one which is about to be held become, at any rate, a yearly fixture.

A FRENCH PRESIDENTIAL ADDRESS ON COAL.

A YEAR ago, in our issues of Jan. 22 and 29, we gave a translation of the Presidential Address of M. Emile Cornuault, a well-known Gas Engineer, before the Société des Ingénieurs Civils of France. His year of office has just expired; and a very successful year it has proved. Ill-health unfortunately prevented him from presiding at the last function of his presidential term on the 10th ult., when M. Reumaux, the new President of the Society (which now numbers 3694 members) was installed in office. Reference was made to the outstanding features of the past year, and to the special meeting in June last, when the Society received our Association of Water Engineers. M. Cornuault was warmly thanked for the attention and interest he had consistently shown in the welfare of the Civil Engineers' Society. During his year, the President of the Republic had attended one of the meetings; and there had been a most successful and enjoyable engineering excursion along the Mediterranean coast, visiting electric plants and other works of interest. Altogether, M. Cornuault's occupation of the presidential chair of the French Institution of Civil Engineers, from his opening notable address to the termination of his year of office, has been full of interest and of social and technical activity and progress.

THE NEW PRESIDENT.

After a President engaged in the extraction of all the properties of coal, comes one—reversing the natural order—who is occupied in the excavation of the coal itself. M. Reumaux is one of the leading authorities in France on all things appertaining to coal and coal mining. He is not only a distinguished engineer, but is also an able administrator. He was a student at the Paris Ecole Supérieure des Mines. He entered the service of the collieries at Béthune, and afterwards of the Société des Mines at Lens, both situated in the Pas-de-Calais district. He became Chief Engineer, and later General Manager, of the latter Company, whose annual output of coal he has developed from 200,000 to 3,400,000 tons. He is President of the Northern Section of the Société de l'Industrie Minérale, and has sat on various Commissions. In 1902, he was awarded the Henri Schneider prize of the Society of which he is this year President.

SUMMARY OF THE ADDRESS.

In 1907, the consumption of coal in France was over 54,000,000 tons; while its production was only 36,300,000 tons. To a lesser extent, Belgium is also a coal-importing country. Germany and the United States have increasing needs of their own supplies. The attempts at American coal exportation to the Mediterranean tried a few years ago do not seem to have much commercial importance. Great Britain is the only great exporting country. Its coal riches allow it to supply the demands of other countries without fear of leaving its own requirements short. England alone is the mistress of the world's coal markets. Its riches are practically inexhaustible. As for Germany, the two coalfields of the Ruhr and of Silesia contain greater reserves than those of England. They are estimated at 155,000 million tons to a depth of 1500 metres (about 1640 yards). M. Reumaux then proceeds to consider in some detail the extent of the two chief divisions of the coalfields of Western Europe; the two great formations being situate one north, and the other south, of the Ardennes. Within the last fifteen years, the extent of accessible coal-beds north of the Ardennes has been increased by 130,000 hectares [a hectare = 2·471 or nearly 2½ acres] in the Rhenish-Westphalian basin; 25,000 hectares in the Wurm and the Roer; and 100,000 hectares in the Limburg and Campine formation, of which 80,000 hectares belong to Belgium and 20,000 hectares to Holland. Likewise, south of the Ardennes, the workable surface in the basin of Saarbrück, in Prussia, and in Lorraine has been increased by half as much again. The depths of these resources varies from 300 to 600 metres (328 to 656 yards); and they are practicable because of improvements in sinking methods—such as the freezing process of Dr. Poetsch, and the cementing method of M. Portier; also by increased power in appliances, and improvements in equipment, the range of working has been greatly extended.

The President then propounds the question as to whether new coal-beds can be discovered in France. The sinkings between Gris-Nez and Dunkirk, following upon the Dover coal discovery of 1891, resulted in complete failure. Geologists and engineers have made many notable and praiseworthy investigations into the possibilities of finding further coal-fields; but it must be confessed that they leave the question of the productive capacity of French coal-pits unchanged. Of the 36,000,000 tons produced in France, the Loire contributes 3,750,000 tons; Gard and the Saône-et-Loire districts, 2,000,000 tons each; and Aveyron and the Tarn less than 1,800,000 tons. The old bed of Commentry is all but exhausted; so that two-thirds, or 24,000,000 tons, of the total output is derived from the French branch of the Westphalian coalfield, the extension of which forms the coal-beds of the Nord. Figures follow which give the comparative output of different countries on the same superficial basis, the results for France appearing very favourable. Some details are then given concerning the Pas-de-Calais collieries, with which M. Reumaux is so intimately connected. They only commenced working in 1852, and now raise 60,000 tons per day. The former difficulties of scarcity of labour and inadequacy of transport have been overcome. The pits with central coal-washing works, coke-ovens, and railway connections form a complete whole. The companies house 45 per cent. of their workmen, for whom they have built 25,000 houses, at a cost of 80 million francs, or about £3,200,000.

The President ends with a note of regret. What would they not have been able to do, if their mineral wealth had but allowed? "We should have been able to load the boats which every year leave Cardiff or Newcastle for all parts of the world, or we should have been able to supply those marvellous centres of industrial activity, like Lancashire, the Rhine Valley, or Pennsylvania." Instead of this, France depends on the fertility of its soil and the softness of its climate; and though its industries are not so important as those of England or Germany, it continues in its lead by the finish of its manufactures and the good taste of its artisans.

CARBON MONOXIDE IN COAL GAS.

IN the "JOURNAL" a few weeks ago, brief reference was made to a communication on the above subject submitted to the Paris Academy of Sciences by M. Carnot on behalf of M. Léo Vignon. From the text published in the "Comptes Rendus" we have obtained the following additional particulars.

The author began by pointing out that the distillation of coal produces gases which for the most part originate in the mineral itself, but, also, to a small extent, in the decomposition of the carbonates sometimes mixed with coal. He examined five samples of gas coals, first testing for the carbonic acid of the carbonates by attack with acids and loss of weight, with the following results, expressed in CO_3Ca per cent.: (1) 0·641, (2) 2·550, (3) 0·910, (4) 1·823, (5) 1·886. He tested the same samples of coal after treating them with acidulated water until he had obtained complete decomposition of the carbonates, washed and dried. The following are the results of this elementary analysis:—

Sample.	C.	H.	N.	S.	Ash.	Water at 100°C.	O by Difference.
1.	80·40	5·62	1·44	1·01	2·33	0·91	8·29
2.	77·27	5·03	1·55	0·82	4·40	3·50	7·43
3.	79·11	4·92	1·12	0·70	5·59	1·33	7·23
4.	79·46	4·04	0·72	0·59	5·90	3·38	5·91
5.	85·98	4·12	1·47	0·44	3·48	0·68	3·83

By calculation, and reckoning the volume and composition of the gas contained in the apparatus at the commencement, the author determined the volume of gas resulting from the distillation of each sample of coal, and the percentage of carbon monoxide and dioxide contained in it. Estimating the total weight of oxygen in the distilled gases, and comparing it with the weight in the corresponding coal, he obtained the following results:—

Sample.	Oxygen in 100 Grammes of Coal. A.	Distilled Oxygen in the Gases. B.	Ratio $\frac{B}{A}$
1.	8·29	2·61	0·314
2.	7·43	2·17	0·292
3.	7·23	2·27	0·314
4.	5·91	1·83	0·309
5.	3·83	1·20	0·313

These results apply to a temperature of 900° C., and are different at 1200° C. Thus the value of $\frac{B}{A}$ for coal No. 1 is 0·31 at 900° C., and 0·370 at 1200° C.

As the result of his investigations, the author arrived at the following conclusions: Deducting the carbonates and water existing in the mineral (1) a coal gives more carbon monoxide and carbonic acid in distillation according to its greater percentage content of oxygen; and (2) at 900° C., a little less than one-third of the oxygen in the coal is found in the carbonic acid and carbon monoxide of the resulting gases.

OBITUARY.

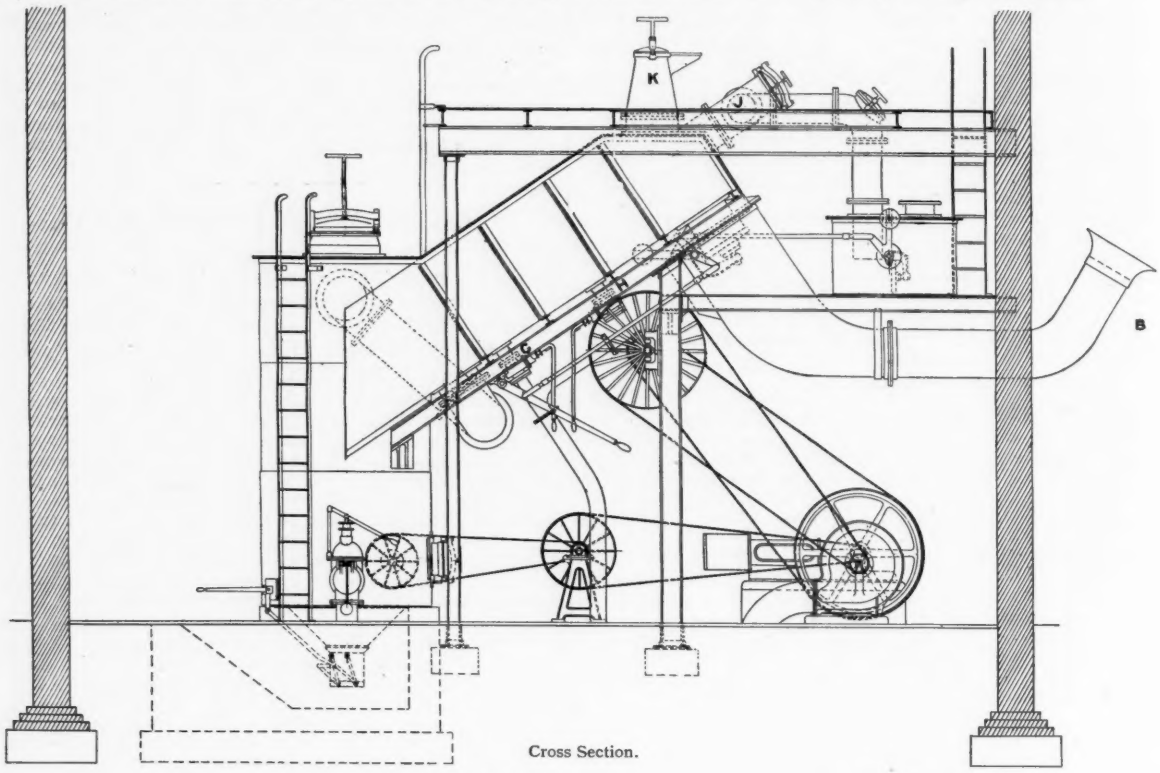
The recent death is announced of Mr. HOPKIN JONES, a very prominent public man in Neath, and Chairman of the Gas Committee of the Corporation.

The death occurred last Tuesday, in his 75th year, as the result of cardiac failure and complications, of Mr. T. TRAVERS WOOD, the Chairman of the Swansea Gas Company. He was appointed a Director in 1875, and was elected Chairman in 1892; and during his connection with the Company the capacity of the works was doubled. He was an authority on the iron and tinplate trades, and at one time owned iron-works at Briton Ferry, and became one of the largest merchants in the metal trades in the district.

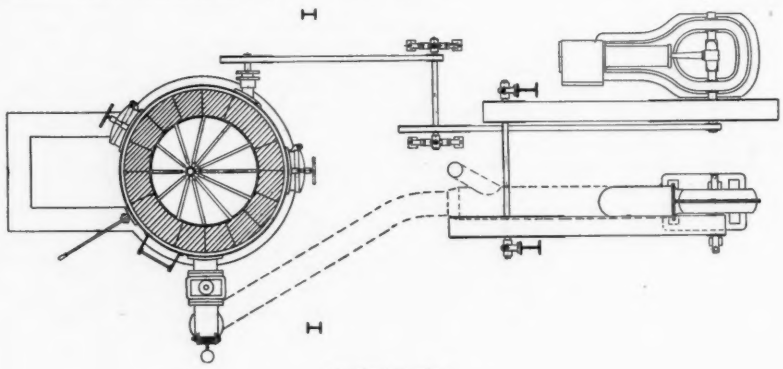
Junior Institution of Engineers.—The twenty-fourth anniversary dinner of the Institution will be held at the Hotel Cecil next Saturday, when the chair will be occupied by the President—M. Gustave Canet, Past-President of the Institution of Civil Engineers of France.

WESTCOTT'S COMBINED COAL AND WATER GAS MANUFACTURING PROCESS.

We illustrate one unit of apparatus designed by Mr. J. T. Westcott, of the Economical Gas Apparatus Construction Company The proposal consists of combining in one plant an inclined coal-gas retort connected with an ordinary water-gas generator.

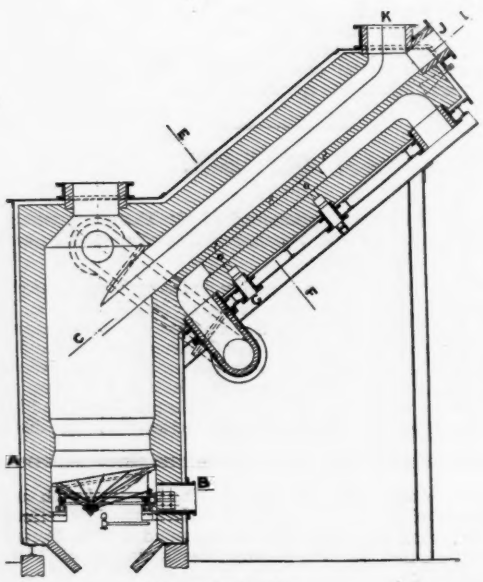


Cross Section.

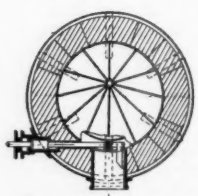


Vertical Section.

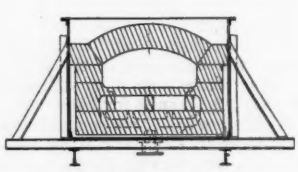
Fig. 1.—General Plan of the Combined Plant.



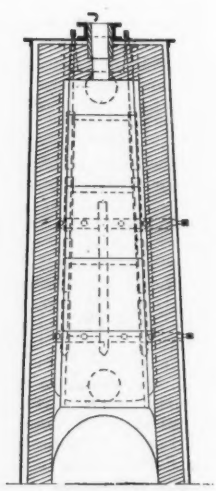
Sectional Elevation.



Section on Line A B.



Section on Line E F.



Section on Line C D.

Fig. 2.—Sectional Views of Plant.

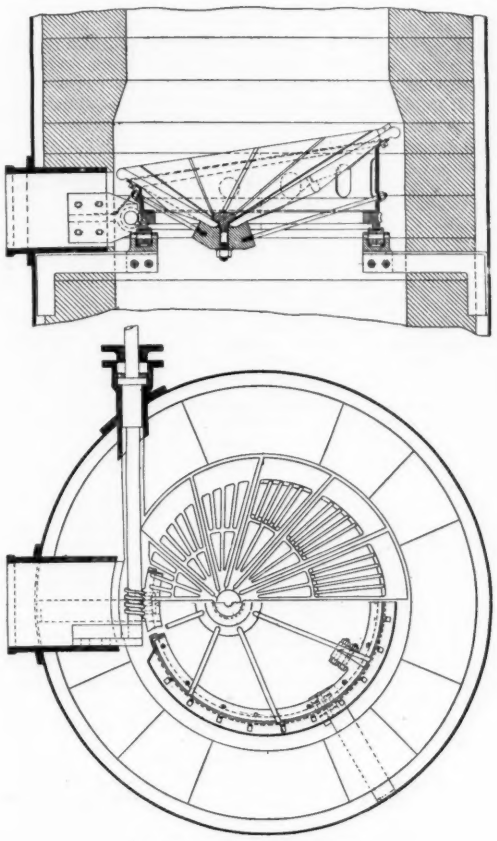


Fig. 3.—Plan of the Grate.

The method of operation is to start an ordinary coke or anthracite coal fire in the generator, and to charge the inclined retort from the hopper. The generator fire is prepared for the decomposition of the steam by means of forced draught from the blower, and the percentage of partial products of combustion that may be required for heating up the inclined retort are passed from the top of the generator to the flues under the retort, where complete combustion is secured by admitting additional air at the blast entrances G H—the waste products of combustion escaping at the stack B.

When the generator is ready for gas-making, the blast and stack valves are closed; and steam is admitted under the generator grate in the usual way. The water gas passes through the inclined retort, coming into close contact and forming a mixture with the coal gas—the two gases passing out of the retort at J to the seal. After the plant is in complete working order, the inclined retort is from time to time charged from the hopper K with ordinary gas coal, and discharges into the generator.

It will be noted that everything in the coal is by one process converted into gas except the ammoniacal liquor and the ash. The latter is automatically discharged into a water seal by means of a revolving grate operated from the engine or turbine that supplies power to the blower. This grate keeps the fuel-bed in a constant state of agitation, and is one of the essential features for the success of plant of this type, owing to the trouble that would otherwise arise from the clogging of the tarry matter from the coal before it was gasified and entirely consumed.

The detailed working drawings of the plant were, we understand, prepared about the year 1902 at the London Offices of the Economical Gas Apparatus Construction Company; and from careful calculations, based upon actual practical working conditions, it is estimated (exclusive of boiler fuel in every instance) that from one ton of ordinary gas coal there will be obtained 45,750 cubic feet of gas having a gross calorific value of 407 B.Th.U. per cubic foot, and a candle power of 6·65. The consumption of one ton of gas coal will give about 29,120,000 B.Th.U.; the consumption of the gas made from one ton of gas coal by the usual method of retorts and coke in blue water gas plant will give about 13,998,400 B.Th.U.; and the consumption of gas made from one ton of coal by the plant now described will, it is estimated, give 16,832,320 B.Th.U.

Society of British Gas Industries.—We learn from the Secretary (Mr. Arthur L. Griffith) that the annual general meeting of the Society will take place at the Holborn Restaurant on Wednesday afternoon, the 26th inst., when the chair will be taken by the President, Mr. Dugald Clerk, after which Sir George Livesey, the new President, will be inducted, and will deliver his Presidential Address.

WATER BILLS FOR 1908.

In preceding issues of the "Journal," the principal features of the Gas Bills and Provisional Orders for the present session have been noticed. We now deal with those relating to water supply—taking first the measures brought forward by Companies.

The Holderness Water Bill has been promoted by certain gentlemen who are desirous of being united in a Company for supplying water within the borough of Hedon and adjacent places in the East Riding of the county of York. The capital of the Company is to be £100,000, in £10 shares; and power is required to borrow to the extent of one-third of this amount, and to create debenture stock. The parties named as promoters, and one other person to be nominated by them, are to be the Directors of the Company; and they are to continue in office till the first ordinary meeting held after the passing of the Act. It is proposed to construct a well and pumping-station in the parish of Lockington, in the rural district of Beverley; a service reservoir in the parish of Holme-on-the-Wolds, in the same district; two conduits or pipe-lines; and a water-tower in the parish and borough of Hedon. A period of seven years is asked for the completion of the works. It is not proposed to give a constant supply of water, or to furnish it at a greater pressure than that at which the works will deliver it in the district. The rates to be charged are to be assessed on the gross estimated rental of the premises supplied; the minimum sum being 8s. 8d. per annum and the period twelve months. All inns and hotels, whether public or private, the gross estimated rental of which exceeds £5, are to be liable to a yearly rate not exceeding 10 per cent. Closets, beyond the first, and fixed baths are to be extras. Water supplied by measure is to be charged for at a rate not exceeding 2s. per 1000 gallons, with a minimum payment of 8s. a quarter; that used for public purposes, at a maximum of 1s. 6d. per 1000 gallons. Provision is made for the sale of water in bulk. The Company ask to be authorized to purchase from the Urban District Council of Hornsea their existing waterworks; and also to sell their undertaking, or part of it, to any local authority whose district is within the limits of the Act, which are the borough of Hedon, the urban districts of Hornsea and Withernsea, and a number of rural districts and parishes in the East Riding of York. [*Parliamentary Agent: Mr. J. Kennedy.*]

Powers are sought by the Pontypridd Water-Works Company to construct additional works, consisting of an impounding reservoir on the River Neath, another on the Afon Llia, three service reservoirs, a tramroad, and a number of aqueducts or pipe-lines and other works. The Bill contains full provisions in regard to compensation water. A period of fifteen years is asked for the completion of the works. Notwithstanding any arrangement made between the Company and the Llantwit Fardre and Llantrisant Rural District Council, it is proposed that the last-named place shall be included within the Company's limits after the passing of the Act. The charges for water are to be based on the rateable value of the premises supplied; and they range from 2d. to 4d. per week for the smaller houses and from 10 down to 6 per cent. per annum for the larger ones, with 7s. 6d. for each closet beyond the first and 10s. 6d. for a bath. Supplies by measure and in bulk are to be afforded on such terms as the Company think fit. Authority is asked to raise additional capital to the amount (including premium) of £650,000, the dividend on which is to be 7 per cent. per annum if the capital is raised as ordinary, and 6 per cent. if as preference; to borrow to the extent of one-third; and to create debenture stock. [*Parliamentary Agents: Messrs. W. & W. M. Bell.*]

The Rhymney and Aber Valleys Gas and Water Bill is to confer power upon the Rhymney and Aber Valleys Gas and Water Company to construct additional works. The portion of the Bill relating to the gas undertaking of the Company has already been noticed (see *ante*, p. 88). The new water-works proposed consist of two springs, an aqueduct or pipe-line, and a service-tank. An extension of time, by three years, is required in respect of two filter-beds, a service-tank, and two conduits authorized by the Company's Act of 1892; and permission is sought to revive the period limited by the Act of 1898 for the completion of the No. 1 reservoir, together with the aqueducts or pipe-lines and filter-beds sanctioned by section 56 of that Act, and to extend it by three years. For the completion of the new works specified, seven years are asked. The Bill contains provisions for the sale of water by measure and in bulk, on such terms as the Company may determine, as well as others in regard to the prevention of waste and pollution of the water. The capital clauses have been dealt with in the notice of the gas portion of the Bill. [*Parliamentary Agents: Messrs. W. & W. M. Bell.*]

Various additional powers are sought by the South Lincolnshire Water Company. In the first place, they wish to have their limits of supply extended so as to include the parishes of Pinchbeck, Surfleet, Gosberton, Quadring, and Donnington, in the county of Lincoln. Next they ask for the rescission of an agreement made on June 19, 1906, between the Bourne Company and Mr. A. R. Blanchett, the repeal of sections 38 and 39 of the Act of the above-named year, and the confirmation of an agreement for the purchase of the Fen Company's undertaking. Further, they ask permission to increase their capital to £45,000, with borrowing powers to the extent of £15,000; the sums in the Act of 1906 being £30,000 and £10,000 respectively. One part of the Bill relates to the supply of water in bulk by the Company to the

Lincoln Corporation; and they ask to have the limits specified in the Act of 1906 further extended to include the urban district of Bracebridge, the parish of Waddington, and certain parts of the rural districts of Bourne, Grantham, and Sleaford, in the county of Lincoln. In the event of an agreement being made between the Company and the Corporation, the supply of water to them is to be considered as a distinct undertaking, and separate accounts are to be kept, which the Corporation will be entitled to have audited. Authority is asked to raise £200,000, either on mortgage or by the issue of debenture stock, in respect of the Lincoln undertaking. [*Parliamentary Agents: Messrs. Baker and Co.*]

The Bill promoted by the South-West Suburban Water Company is to enable them to raise additional capital not exceeding £100,000, to be entitled to 7 or 5 per cent. per annum dividend according as it is raised as ordinary or preference capital, and to carry borrowing powers to the extent of one-third. Authority is sought for the creation of debenture stock. The new shares are to be put up to auction or tender, and those not sold are to be offered to the shareholders. [*Parliamentary Agents: Messrs. W. & W. M. Bell.*]

AN OBSTACLE TO GAS COOKING AND HEATING.

It might be of some little interest and utility if the precise effect upon gas consumption of the increasing habit of Londoners and others to become dwellers in "flats" rather than in houses, were ascertained. Where such a mode of living is general—as, for instance, in Edinburgh and other Scottish towns—it is well known that it must be fully taken into consideration when making any comparisons as to gas sold or number of consumers per mile of main. So, too, the question of rent plays its part in determining the congestion or scatteredness of the human family; and also, incidentally, as to the amount of gas consumed on any given basis. The recent instructive report, issued by the Board of Trade under Mr. Lloyd-George, on the cost and manner of living of the working classes, indirectly bears upon the same topic. When one knows that, after London, Plymouth is the next most highly rented town in England, it partially assists in explaining the always high figure of consumers per mile in that town. Of course, many other circumstances arise to be taken into consideration; but all we say is that rentals and methods of living are both important factors in the quantity and manner of gas consumption.

The habit of "flat" life—resorted to as a refuge from, or mitigation of, evils both financial and domestic—should, it would seem, be of great advantage to gas undertakings. If carried to any extent, it signifies less extension of mains and greater concentration of effort. Being a resource from domestic and household cares, it implies a larger demand for labour-saving appliances and increased conveniences in the shape of gas-fires and gas-cookers. In this particular direction, is as much attention being given as is deserved? Can the prospective flat-holder, small or large (and generally the former), at once see and secure the appliances most suited to his requirements? It does not follow that the size or design of gas fire or oven most suitable for the rooms of a house will of necessity be the best also for a flat installation. The circumstances and surroundings are different in the two cases; and the good business man and manufacturer will see to it that his wares are exactly suited in design, price, consumption, and utility to the very situation and purpose for which they are demanded.

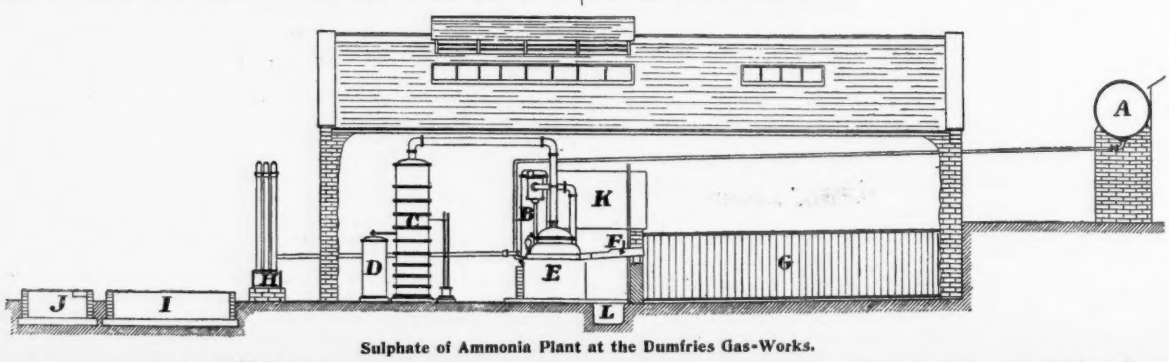
That is really by the way; for the connection between "flats" and gas has been brought to our personal notice quite recently by an obstacle to its adoption in them rather than its increased use by them. The flats we refer to are suites of rooms built in large barrack-like blocks in various parts of London, but principally, perhaps, in the Western and South-Western districts. They are built and managed by large financial and land companies, controlling, in some instances, what are almost small towns in themselves. They make rules and regulations for themselves, their tenants, and their estates. Among their rules is one to the effect that all gas-fitting shall be done by their own working staff. Their minimum charge for fixing a gas fire or cooker—however simple the operation may be—is generally 10s. The result of this is that, after the unwitting tenant has carefully chosen his gas fires or oven, and they have been duly delivered by the gas company, he finds this exorbitant minimum charge thrust upon him; and in some cases he elects to go without his desired gas conveniences rather than pay a fancy gas-fitting bill to his none too obliging or generous landlord-company. Appeal to the gas company's men who deliver the goods to do the fitting as well, is generally met with the reply that they are not allowed to erect, but deliver only—rather wasted or duplicate time and labour, one would think. Sometimes, as we know, the offer of a shilling or so is enough to induce the gas company's men to disregard any limitation to their work; and they gladly and quickly carry out the required fitting. But whether they be so persuaded or not (and to their credit, be it said, that in the case referred to they did the work), here is a decided handicap to the extended use of gas in just the place where its development ought to be the most marked. Where the flats are larger and more expensive, and where perhaps the lighting is effected by electricity, the difficulties attending the introduction of gas fires and cookers are even greater. If gas is already laid on, the mere installing of a gas-cooker where one has been before involves the minimum payment of 10s. If no provision at all has been made for gas—or but little—the would-be gas consumer is assured of a pretty heavy bill from the monopolistic fitters, the landlords.

The freer the commodity sold, the greater the sale; and such restrictions as we have referred to cannot but retard the consumption of gas. If this has been the case, as it has in particular instances within our own knowledge, it is probable that it is also so generally. No doubt at the time that large blocks of flats are being built, arrangements are entered into between the estate and the gas companies; and perhaps the future care of the tenant in gas matters is not fully considered. But it appears to us that it would be well to safeguard future gas clients from any negligent or extortionate gas-fitting. Gas for cooking and heating is now of especial importance in flats, and proper prevision should be shown by gas companies for the gas welfare of such dwellers.

NEW SULPHATE PLANT AT DUMFRIES.

In the "Notes from Scotland" in the "Journal" for the 21st ult., it was mentioned that the sulphate of ammonia plant which had been in course of erection at the Dumfries Gas-Works had been completed, and that it was proposed to hold an opening ceremony in connection with the event. We give to-day the following particulars in regard to the plant, the starting of which took place on the 23rd ult. The plant is of the continuous low-pressure type, but it can also be worked intermittently; and it is capable of producing 135 tons of sulphate per annum. The liquor is pumped into an elevated tank having a capacity of 7000 gallons, built on piers. From this tank it gravitates to a heater in the sulphate-house, after which it enters the still at the top, and descends slowly through the twelve sections of weirs to the bottom. At about the middle of the still, milk of lime is introduced from a liming chamber, to drive off any fixed ammonia. Steam is introduced at the lowest part of the still, in order to raise the liquor to its highest temperature. This drives off all the ammonia, which is led from the top of the still to the saturator, in which it is precipitated in the form of sulphate. The bottom of the saturator is sloped to the open front. From the drainage-table the sulphate is removed to a large store. The hot waste gases pass successively from the saturator through the heater, the condenser, and the oxide purifier, and are then diffused into the air. The effluent from the still runs into a cooling-tank.

There was much controversy in Dumfries at the time the suggestion to make sulphate of ammonia at the gas-works was first brought forward; and the wisdom of the Corporation in laying down plant for the purpose was questioned. It was thought to be suitable only in the case of gas-works in large cities. However, the enterprise of the Corporation will, we believe, be amply rewarded; and as a good local market is anticipated for at least the bulk of their product, the estimated annual profit of £500 may be realized. The whole installation has been erected under the superintendence of Mr. George Malam, the Gas Engineer and Manager to the Corporation.



Sulphate of Ammonia Plant at the Dumfries Gas-Works.

A. Liquor Storage Tank. B. Heater. C. Still. D. Liming Chamber. E. Saturator. F. Draining Table. G. Sulphate Store. H. Condensers. I Purifier. J. Settling and Cooling Tank. K. Acid Tank. L. Mother Liquor Well.

THE NEW GAS-WORKS ON THE TREKVLIET CANAL AT THE HAGUE.

By Heer J. E. H. Bakhuis, Engineer of the Municipal Gas Undertaking of The Hague.*

[Abstract Translation of a Paper read by the Author, on Nov. 23, 1907, before the Dutch Royal Institute of Engineers.]

The regular rise in the consumption of gas at The Hague indicated that a second gas-works was urgently required. The old gas-works on the Loosduinen Road had a maximum productive capacity of 5,295,000 cubic feet of gas per diem, and further extension on that site was undesirable for various reasons.

The maximum consumption per diem reached 5,930,000 cubic

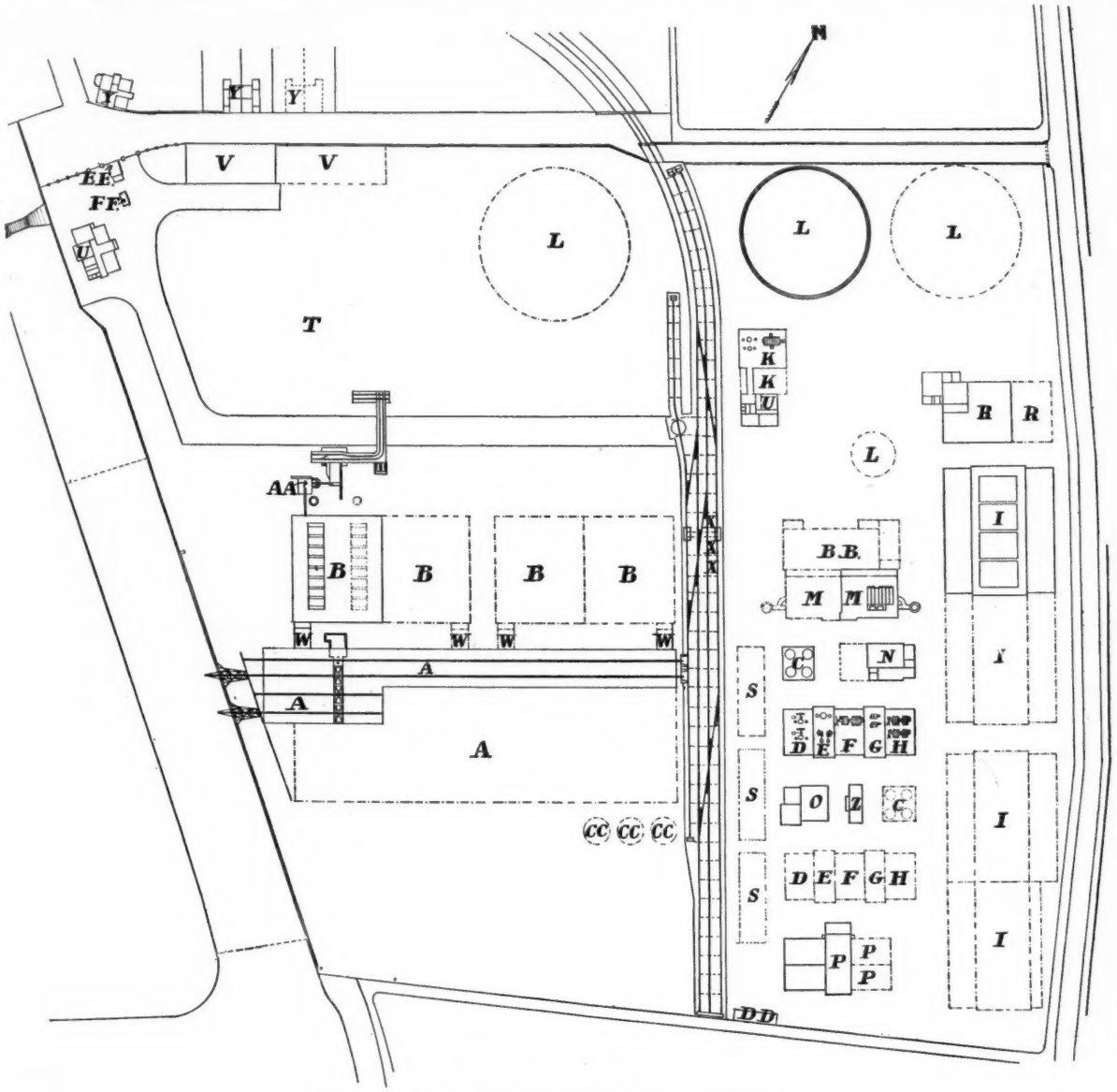


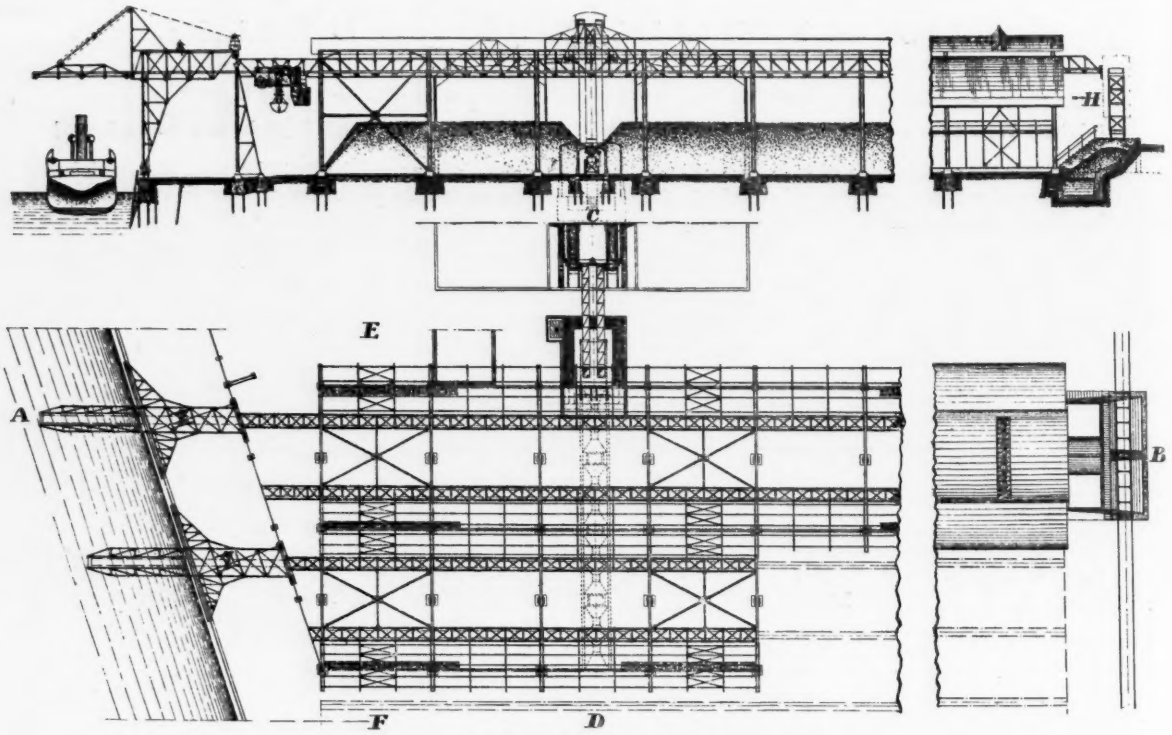
Fig. 1.—The Hague New Gas-Works—Plan of Site and Buildings.

A. Coal-stores.
B. Retort-houses.
C. Surface condensers.
D. Exhausters.
E. Pelouze tar extractors.
F. Naphthalene and cyanogen washers.
G. Water-cooled condensers.
H. Ammonia washers.
I. Purifiers.
K. Station-meter and governors.
L. Gasholders.
M. Boiler-house.
N. Central electrical plant.
O. Water tower and reservoir.
P. Bye-products works.
R. Workshops and laboratory.
S. Tar-well.
T. Coke-yard.
U. Canteen.
V. Stores.
W. Eating-room.
X. Bath-rooms.
Y. Dwelling-houses.
Z. Filtering plant.
A A. Coke conveyors.
B B. Water-gas plant.
C C. Oil-tanks.
D D. Sulphate-store.
E E. Porter's lodge.
F F. Time recorder.

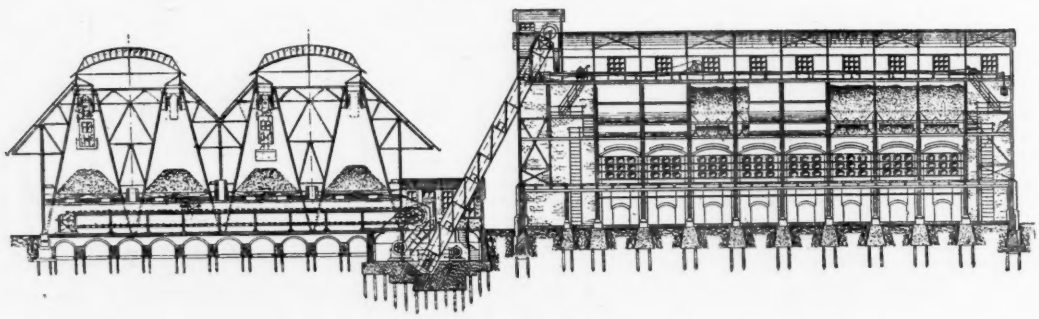
feet in 1906, and the co-operation of the new works was imperatively required for the next winter to cope with the increasing consumption. After consideration of various sites for the new works, the choice fell upon one lying to the south of the Dutch Railway, and to the east of the Trekvliet (a canal). In January, 1904, the Corporation decided to buy this site for the new gas-works. It is favourably situated; being on a deep water-way, and between two railway lines. It is also quite close to the town, and well placed in relation to the old gas-works and the distributing system. The only objection to it is that the road communications must await development till the scheme of the Corporation for the extension of the municipality is settled.

The area available for the works is 29·65 acres in extent, and will suffice for a productive capacity of 10,590,000 cubic feet per diem, of which four-fifths will be coal gas and one-fifth water gas. There will be four retort-houses, each of a capacity of 2,118,000 cubic feet per diem; while the accessory plant attached to each will be of nearly 2,650,000 cubic feet nominal capacity. The gasholder accommodation will be equivalent to about 80 per cent. of the maximum day's make of 8,472,000 cubic feet, distributed between two holders of 2,471,000 cubic feet each, and one of 3,530,000 cubic feet. In the first place there has been erected only one bench of retort-settings, for a make of 1,059,000 cubic feet per diem, in one retort-house. For structural reasons, however, the condensers have been planned at once for a make of

* Heer Bakhuis evidently wrote his paper for presentation to a general engineering audience such as would be present at the meeting of the Institute before which it was read; and while some matter with which all gas engineers would be familiar has been omitted from this translation, it has been found expedient, for the sake of the continuity and completeness of the narrative, to retain other portions which some readers of the "Journal" may consider elementary.—Ed. J. G. L.



Longitudinal Section and Plan.



Section on Line C D.

Fig. 2.—The Coal Unloading and Transporting Plant.

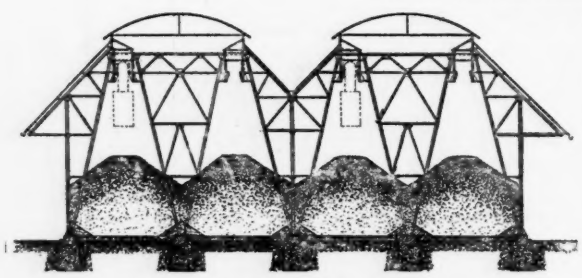


Fig. 3.—Cross Section of the Coal Stores.

5,295,000 cubic feet; while the washing and scrubbing plant comprises two sets of apparatus of 2,647,000 cubic feet capacity, of which half has been erected. The purifiers and station meter are of the same capacity. Of the gasholders, one of 2,471,000 cubic feet has been erected. Fig. 1 is a plan showing the space allotted to the buildings and plant, according to the scheme of construction. The buildings and plant not yet erected are shown by dotted lines.

Coal-Handling Plant.

In order to facilitate the delivery of coal and other materials by water, the canal has been dredged out to a depth of 9 ft. 2 in. in front of the works; and a sunken boom has been thrown across at the limit of this deep water, along the extent of which the canal has been walled. Along the upper part of the canal an iron and stone fence has been erected. Railway connection has been made with the Dutch Railway, which hereabouts is at a high level; so that the branch into the works is a viaduct. Consequently the road traffic, both in and outside the works, is not interfered with. The viaduct has been carried out in reinforced concrete by a Dutch Company who do this work at The Hague. It is wide enough for four railway tracks, and has a siding for loading coke. There are two weighbridges on through tracks, and a turntable. The space under the arches of the viaduct is available for all kinds of useful purposes; so that the railway occupies very little of the ground space of the works. Between this viaduct and the canal are the coal-stores, which are 525 feet long. When completed, they will take 3000 waggons.

Lengthwise through these stores run straight elevated railways, at a height of 34 ft. 6 in. from the ground, from the rails of which the waggons are suspended. The girders for these railways are 39 ft. 4 in. apart, and serve at the same time as the rafters of the coal-store, for which only side-walls and a roof-covering are necessary in addition. The walls are of armoured concrete, and the roof is of corrugated galvanized iron. By the bank of the canal the elevated railways can be extended over the boats bringing the coal by means of travelling bridge cranes (figs. 2 and 4). These railways are traversed by suspended motor waggons, which, as they are manipulated by a single engine-man, are designated "man trolleys." These trolleys are each equipped with a coal grab of 1½ tons capacity. One electro-motor serves for grabbing and lifting and another for driving the trolleys. There is also an automatic weighing apparatus.

By these means the coal can be taken from the boats and conveyed over the whole length of the coal-store. The coal is thus handled very quickly, and is stored over a tunnel which is built transversely under the store. The coal can then be dropped on to a band conveyor within the tunnel, and conveyed by it to a coal breaker and elevator. The latter takes it up into the retort-house on to two horizontal rubber band conveyors placed above the coal-bunkers. The coal is discharged by means of a carriage into any bunker at will. Each setting has its own coal-bunker, containing a 24 hours' supply. Each bunker is provided with three measuring chambers, one corresponding with each vertical row of retorts, so that all the retorts can be filled with the proper quantity of coal by the charging machines referred to later. To avoid risk of interruption, the breakers, elevators, and conveyors are provided in duplicate. When fresh coal is not being brought in, the "man-trolleys" are employed in bringing the stored coal over the tunnel. Coal arriving by railway is tipped by means of a travelling waggon-tip into a large store-pit, from which it is taken, as required, as from the hold of a boat on the canal (see

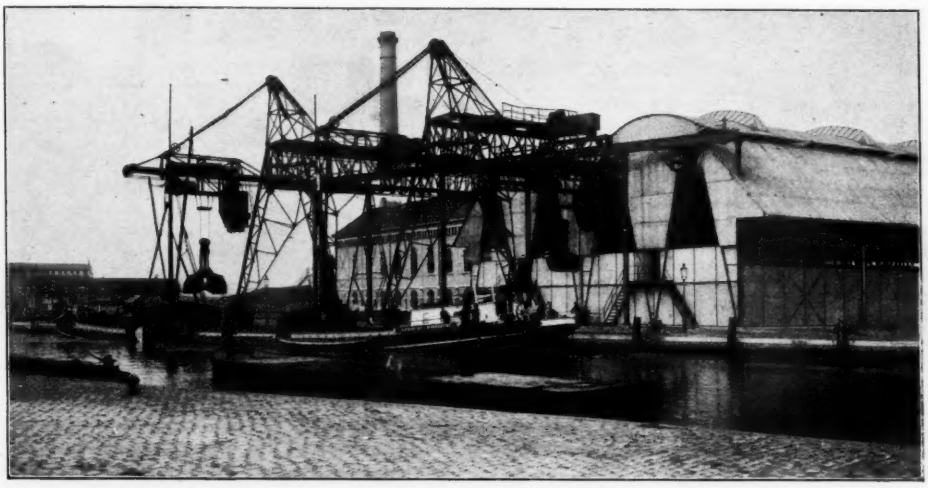


Fig. 4.—The Coal Unloading Plant at the Canal-Side.

(fig. 5). The coal-handling plant has been supplied by the firm of Pohlig, of Cologne.

Retort-House.

Four retort-houses at right angles to the coal-store are projected; and the first has been built. Above the stage level, the building is carried up as an iron panel structure on a substantial masonry foundation. A heavy iron middle structure supports the heavy coal-bunkers with a load of about 260 tons. On each side of this middle structure is a bench of eight settings, each with nine retorts 19 ft. 8 in. long. The productive capacity is from 141,000 to 176,000 cubic feet of gas per diem per setting. The retorts are charged by electrically-driven De Brouwer charging-machines, which receive the proper charge of coal (from the measuring chambers already mentioned) on a rapidly-travelling belt, which projects the coal into the retort. A cross-section of the retort-house is shown in fig. 6.

Coke-Handling.

After carbonization, a discharging machine, also electrically driven, pushes the coke out of the retort. The coke falls into a De Brouwer trough, which runs in front of the settings. The chain conveyor draws the coke (which is quenched in the trough) outside, and delivers it into a storage pit, capable of holding one night's production. From the pit the coke can be discharged on to a screening trough; and it is then conveyed by an elevator, through a breaker if necessary, to the sorting screens. The latter separate it into breeze, small, medium, and large coke, all of which fall into separate receivers, from which it is drawn off into measures for sale. The large coke from the outlet of the screens is collected in tip-waggons and conveyed by an elevated railway to the coke yard, which, with a depth of 23 feet, can store 960,000 bushels. The coke conveying and sorting plant is seen in fig. 7.

Purification.

The crude gas is taken from the retort-house by a main passing alongside the coal-store to the surface condensers, which cool it to 68° to 77° Fahr. The condensers are sheet-iron cylinders 9 ft. 10 in. diameter and 88 ft. 6 in. high, having an internal air pipe nearly 3 feet in diameter. The gas traverses these vessels in an upward direction, and the products of condensation descend against the stream of warm gas, from which they withdraw heat, so that broadly only the gas is cooled. Air can be drawn for cooling purposes through the central air way, either upwards or downwards as desired. Only half the condenser need be used when condensation is too severe.

The gas then enters the washer-scrubber buildings, which contain first the exhausters, with governors, by which the gas is drawn from the retort-house and driven through the rest of the apparatus to the gasholder. Then follow tar-extractors of the Pelouze type, naphthalene and cyanogen washers, water-condensers of Reutter's pattern, and ammonia washers. Two engines, by Stork and Co., with gearing, are used for driving the washers. Anthracene oil is used for extracting naphthalene,

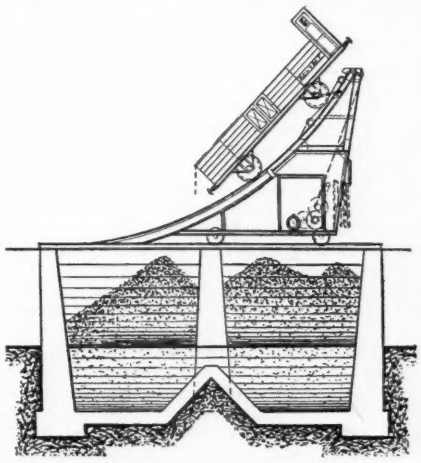


Fig. 5.—Upending Railway Waggons above the Coal Store.

oxide of iron suspended in an alkaline solution for recovering cyanogen, and water and purified ammoniacal liquor for extracting ammonia. There is at present one set of apparatus with reserve items in the building; but there is room for two sets. The connections are in a well-lighted and ventilated cellar; so that they are readily accessible.

The gas now needs to be freed from sulphuretted hydrogen. For this purpose there are four vessels, 32 ft. 9½ in. by 49 ft. 2½ in. in area, and 5 ft. 3 in. deep, contained in the purifying house

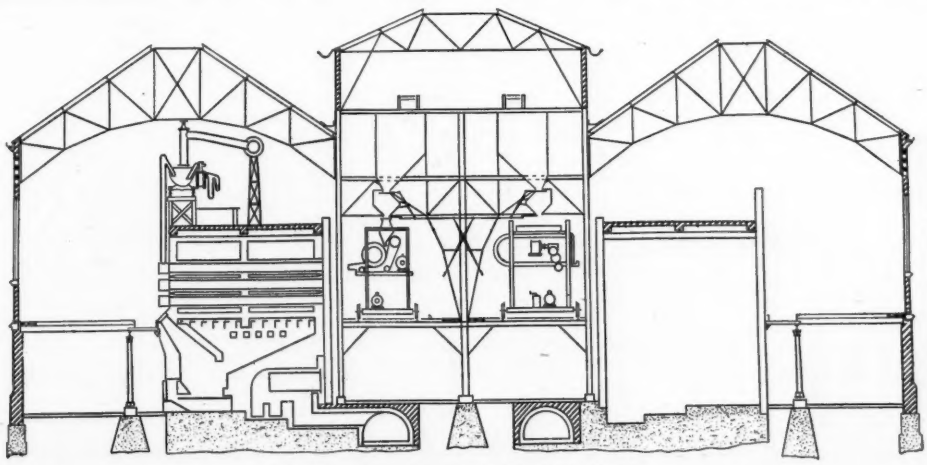


Fig. 6.—Cross Section of the Retort-House.

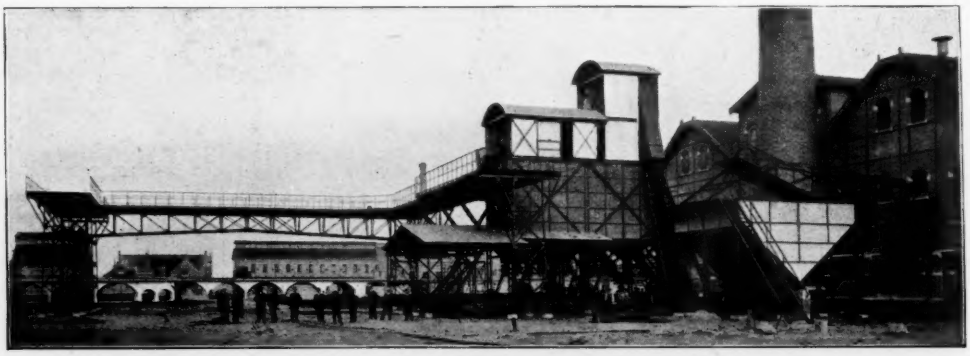


Fig. 7.—Coke Conveying and Sorting Plant.

(fig. 8). Iron ore is the material employed in them. The vessels are placed at a high level, and each is closed by two lids. The spent material can be discharged below through four openings in the bottom of a vessel. It is then spread out for revivification on the ground under the vessels or in the wings of the building. Over the vessels runs a travelling crane for lifting the lids and carrying them over an adjacent vessel. With this crane is connected an electrical hoisting apparatus for raising the iron ore overhead, and conveying it horizontally to the vessel which is being filled. The crane is moved and the lids raised by manual power. The four vessels are ranged one behind the other, and are changed by means of five four-way valves. Before the gas enters the gasholder, the make is measured by a four-chamber meter with counter.

The Gasholder.

The gasholder, of 2,470,000 cubic feet capacity, is the largest but one in Holland. The tank is of annular construction, with the bottom 8·2 feet above the ground. The space inside the ring is covered with a flat roof, at a distance of 10 inches below the surface of the water in the ring. Thus the space inside the ring is entirely cut off from the gas space above the surface of the water. The tank is supported by 44 heavy columns, which rest on a firmly rammed concrete ring. Between the columns, window-frames are fixed for lighting the interior, to which a door gives access. The roof, which is covered with water, is supported in the middle by iron standards tied together (see figs. 9 and 10). The bottom of the ring is accessible throughout. The outer wall is formed of heavy steel plates; but the inner wall, on the other hand, is of comparatively thin plates, which merely have to be water-tight. The pressure of the water on the inner wall is taken up by a circular concrete wall, which is rammed against the inner wall. For the sake of economy in ramming the concrete, a stone wall was built on the inside, and the concrete was rammed into the space between it and the annulus in layers a foot deep. The annular tank is 39 ft. 4 in. deep; and the bell of the holder travels within it. The holder consists of the bell and two telescopic lifts, which travel on radial rollers on the guide-framing. The total height of the holder when full is nearly 174 feet above ground level; and the extreme diameter is similarly also nearly 174 feet.

Steam Power, Electric Power, Water Supply, and Repairing Shops.

The boiler-house (shown in fig. 11) contains, for the time being, three Babcock and Wilcox boilers, each of 1959 square feet heating surface, and fitted with a superheater of 248 square feet surface. Behind the boilers is a Green's economizer of about 2583 square feet heating surface. The smallest boiler unit which is worked thus aggregates 4790 square feet of heating surface. The steam pressure is 10 atmospheres, corresponding to a temperature of from 480° to 550° Fahr. The boiler-fuel is coke breeze, which is not well adapted for automatic stoking. Thus it has not been possible here to supersede manual labour by machinery. The boiler-house, however, is provided with a Hunt's conveyor for the mechanical transport of the fuel. This conveyor is of the endless chain type, with tumbling buckets, and is 197 feet long. It will subsequently serve also to supply the water-gas plant. It can deal with 65½ cubic yards of fuel per hour. The close ash-pits of the boilers have sloping bottoms, so that the ashes can be readily removed in tip-waggons. The grates consist of perforated plates with conical blast-nozzles, and so resemble the Kudlicz grates. The air-blast is at present supplied by a Sirocco fan, of a capacity of 141 cubic feet of air per second, at a pressure of 16-10ths of an inch of water. The motive power for the fan is a 4·7 H.P. electro-motor. Water-vapour, amounting to at the most 2 per cent. of the steam generated, is added to the air, in order to avoid, through the production of water gas, the fierce heat striking the blast-nozzles. The grate-plates wear well; and the clinker is soft.

The chinks in the brickwork of the boilers are filled with kieselguhr; and the upper surfaces of the boilers are carefully insulated. The disadvantage of an economizer—bad chimney draught, and, as a consequence, defective combustion—is converted into an advantage; for no cold air is drawn in through leaky places in the boiler-setting and through the open fire-door. The blast, with the relatively small grate-area of 50·6 square feet, produces intense combustion and a high temperature in the fire-box. With ordinary coke a boiler efficiency of more than 90 per cent. has been found. The fuel conveyed to the boiler-house is automatically weighed on a Carl Schenk's weighbridge. The feed water is measured by an Eckardt meter. The steam-pipes are, where necessary to prevent interruption, provided in duplicate. Mannesmann tubes are used for the larger sizes. The flanges are ribbed; and Klingerite is used as packing. Expansion-boxes were not needed, as the connections were carefully arranged. The expansion of the long length of steam-pipe on the viaduct was taken up by curved flanges, which form the most complete expansion device. Magnesia composition, containing 85 per cent. by weight of magnesia and 95 per cent. by volume of air, was used as lagging.

The high steam pressure is unnecessary, and even a disadvantage, for the engines of the electricity generating plant, which consume only a small proportion of the steam produced. It is, however, advantageous, for the following reasons, to generate high-pressure steam, and to let it down to low pressure. The whole of the superfluous pressure can be utilized in driving the steam through the system of pipes, which have been made unusually narrow. The use of these narrow pipes and small fittings increases the reliability in operation, and decreases considerably the loss of heat, and installation and maintenance charges. The duty of the extensive system of steam-pipes is increased by the adoption of high pressure and superheating—on the one hand because the heat losses from the reduced surface of the pipes are smaller, and, on the other hand, because the quantity of latent

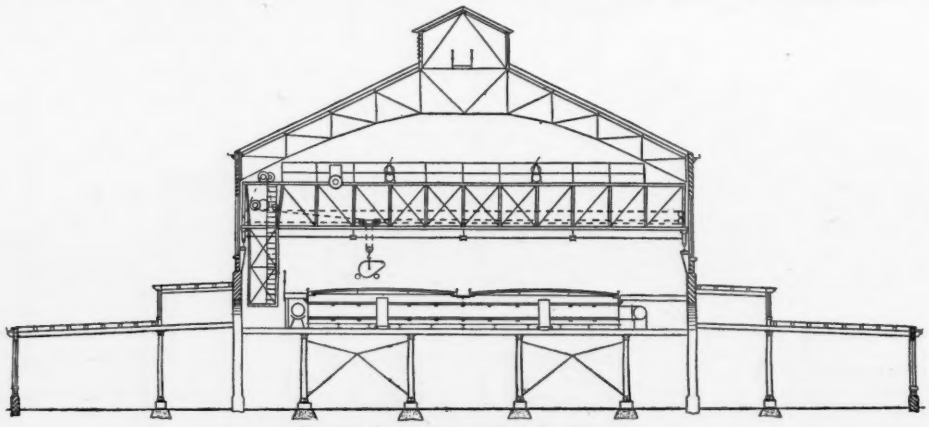


Fig. 8.—Cross Section of Purifier House.

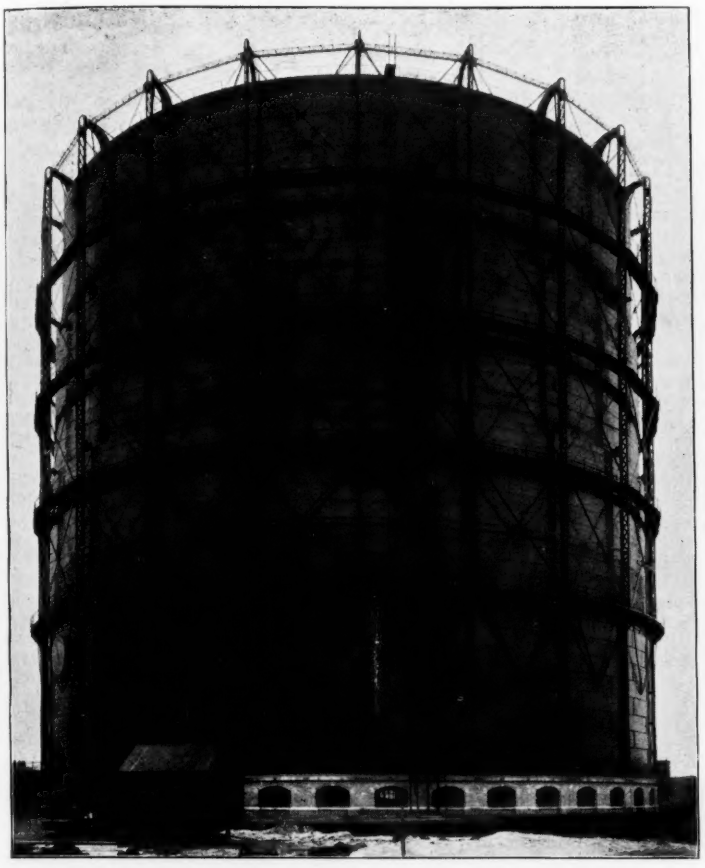


Fig. 9.—The Gasholder as Completed—Capacity about 2¼ Millions.

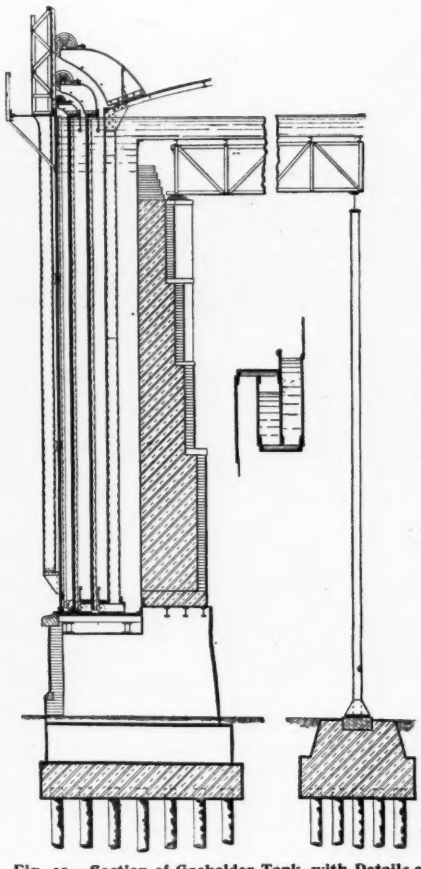


Fig. 10.—Section of Gasholder Tank, with Details of the Cups.

heat lost in the water condensed is wholly or partly got rid of. The only disadvantage of superheating is that, for the same sizes of pipes, the loss of pressure is found to be greater for the same steam consumption.

The electric energy required for actuating the conveyors and various apparatus is generated in a special station. The latter contains two high-speed steam-engines of 250 H.P., by Boulte Labourdière et Cie., of Aubervilliers, making 400 revolutions per minute. These are directly coupled with dynamos of 150 kilowatts, by Brown, Boveri, and Co. When tested, these machines showed an average consumption of steam of 22·95 lbs. per kilowatt-hour, at a steam pressure of 137½ lbs. per square inch, and a temperature of 436½° Fahr. before the throttle valve. The engines agree closely with the well-known Belliss engines. Their low cost, simplicity of management, and small requirement of ground space have gained them the preference. In general, the aim has not been in the first place to get the best and latest mechanical appliances for the new gas-works, but rather the most economical engines and apparatus.

There are in the electrical station two tension transformers for charging the battery of accumulators that is generally worked in parallel. The battery comprises 126 cells, and has a guaranteed capacity of 1030 ampere-hours, which capacity, according to tests, can be exceeded by about 20 per cent. The current chosen is direct, of 220 volts. The heavy jerks due to the working of the coal grabs and waggons have rendered it necessary to insert a buffer appliance. For most operations on a gas-works, alternating current motors are preferable; consequently, a transformer with a nickel-steel fly-wheel has been inserted for converting alternating to direct current. Moreover, a direct-current installation with a battery of accumulators makes for reliability; and its value for night working must not be underestimated. There are 50 electro-motors, large and small, with a total of 427 H.P. The 50-H.P. motors for the grabs, however, only act spasmodically; so that as a rule only a tenth at the most is in operation at the same moment. The electric lighting is confined to the spots where this light is advantageous. It comprises 10 arc lamps, 69 tantalum lamps, and 21 carbon filament lamps.

A special water supply was decided upon for the works requirements. The deep-well water from the Norton wells is that used; and it is improved by treatment for the removal of iron. In the pump-house there are, side by side, steam plunger-pumps and electric centrifugal pumps, having a capacity of 6600 and 11,000 gallons per hour respectively. The electric pumps work without requiring an attendant. A water reservoir, of about 22,000 gallons capacity, is situated at a height of 82 feet in the water-tower. Above the pump-room, in which are also the tar and liquor pumps, is a reservoir in five sections, of 3300 gallons

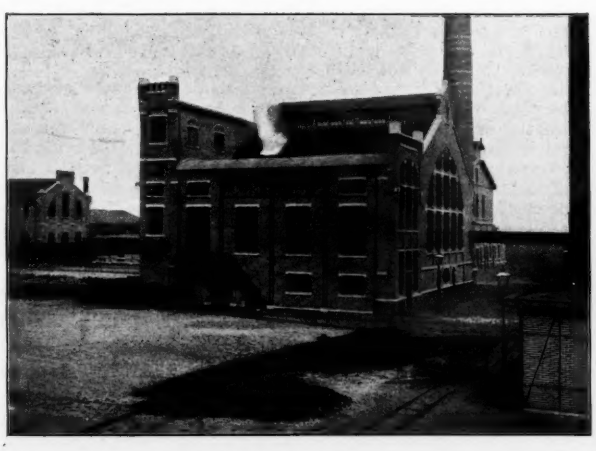


Fig. 11.—The Boiler-House.

Fig. 12.—The Water Tower.

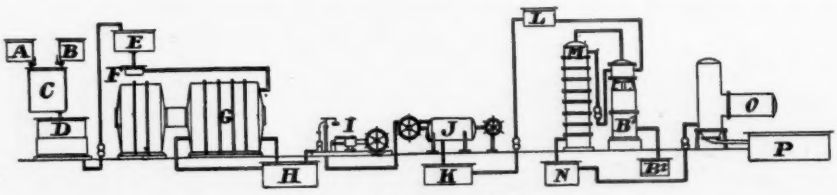


Fig. 13.—The Ferrocyanide Plant.

A. Ferrous sulphate.
B. Concentrated ammonia liquor.
C. Precipitating and washing tank.
D. Fresh washing solution.
E. Working tank of fresh solution.
F. Tip-tank.
G. Washer.
H. Crude used washer solution.
I. Filter-press pump.
J. Filter-press.
K. Filtered washer solution.
L. ,, ,, ,,
M. Feldmann's still.
N. Washer solution freed from ammonia.
O. Evaporator.
P. Crystallizer tank.
B¹. Condenser.
B¹¹. Concentrated ammoniacal liquor.

capacity, for tar and liquor. The tar-reservoirs serve for measuring the tar; and to facilitate the measurement, they are provided with an electrical controller. The tar-pumps can be kept going uninterruptedly, while the measured tar is delivered on the viaduct or elsewhere.

The repairing shop is very fully equipped. A single electromotor of 24 H.P. appeared much less costly for motive power than a number of small ones. Appliances requiring a total power of at least 48 H.P. can now be safely connected up. There are five forges with underground flues. A pneumatic hammer, weighing 165 lbs., has been supplied by Billeter and Klunz. There are also a lathe by Lodge and Shipley, a radial drilling machine, and other comparatively modern machines and appliances. In the two months which have passed, more than 10 tons of iron has been worked up by the staff. The area of the metal-working shops is 4300 square feet. Enlargement will soon be necessary, and can be effected by extending the building at one end.

Bye-Products Works.

In the bye-products works ammoniacal liquor is worked up to sulphate, and the cyanogen lye and precipitates, resulting from the washing of the gas with an alkaline solution in which ferrous carbonate is suspended, are worked up to sodium ferrocyanide. There is, further, provision for purifying crude ammoniacal liquor from its carbonic acid and sulphuretted hydrogen, in order to obtain purified liquor to serve as a washing medium for the crude

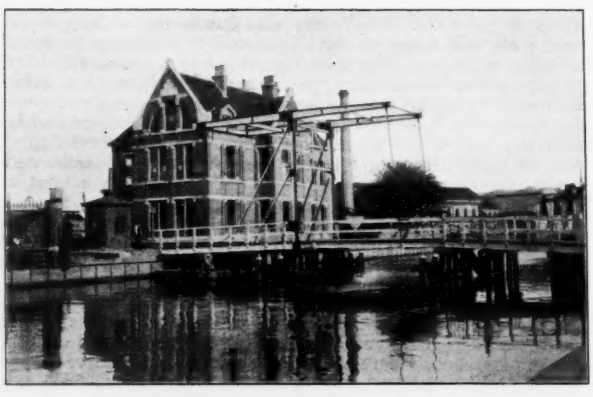


Fig. 14.—The Offices and Draw-Bridge leading to the Works.

gas in the Kirkham washer. The ammonia vigorously absorbs sulphuretted hydrogen and carbonic acid from the gas.

The ammoniacal liquor is worked up in the usual manner to sulphate, by driving off the ammonia gas by the aid of steam in the distilling apparatus for the purpose. The ammonia gas, contaminated with sulphuretted hydrogen, carbonic acid, and some cyanogen, is led into sulphuric acid, by which all the ammonia is retained, while the sulphuretted hydrogen and other impurities pass away to the flues. The sulphuric acid in the saturators is gradually converted into a strong solution of sulphate of ammonia, which finally becomes saturated. The greyish-white crystalline mass of sulphate then separates out. The salt is drawn out at regular intervals, and more sulphuric acid added, without interrupting the distillation. A part of the ammonia in the liquor is in the so-called "fixed" state (that is to say, it is in very stable combination), and lime has to be added during distillation in order to liberate this fixed ammonia. The milk of lime is added by means of a steam lime-pump, which is so constructed that at fixed intervals it suddenly pumps small quantities of milk of lime into the distilling column. The pump can be made to give three strokes per minute, each stroke occupying only a few seconds. To avoid loss of ammonia, the effluent gases from the saturator are again washed with sulphuric acid.

The preparation of ferrocyanides is carried out in the following manner (see fig. 13): The gas containing cyanogen is thoroughly washed in a Kirkham washer with a solution of soda, containing ferrous carbonate in suspension. The cyanides are thereby taken up by the solution, partly as soluble sodium ferrocyanide, and partly as insoluble ferroammonium and ferrosodium ferrocyanides. In the cyanide works, the operations and apparatus are: (1) Arrangements for preparing the iron compounds which, when suspended in the soda solution, constitute the cyanogen washing medium; (2) a filter-press for separating the cyanides in solution from the insoluble; (3) Feldmann's ammonia distillation apparatus for removing the ammonia from the cyanide solution, and condensing the liberated ammonia to concentrated ammoniacal liquor; (4) vacuum evaporating plant for evaporating the cyanogen solution (after it has been freed from ammonia) so as to produce the crude ferrocyanide salt; (5) apparatus for dissolving the crude salt, with a filter press for clarifying the concentrated solution; (6) different crystallizing vessels, in which the purer salt crystallizes out; (7) a boiler for converting the insoluble into soluble ferrocyanides; (8) drying apparatus for drying the pressed cakes; and (9) various lye water, compressed air, vacuum, and filter press pumps.

The motive power is mainly electricity. There are two electromotors, of 10 H.P. and 6 H.P. respectively. Exhaust steam is utilized for evaporating, drying, and the preparation of ammoniacal liquor; for other operations, live steam is brought from the boiler-house. While ammoniacal liquor is worked up at nearly all gas-works of any account, it is otherwise with the preparation of ferrocyanide, which is only carried out at few works. In Holland, besides the two gas-works at the Hague, ferrocyanide is only made at the West Gas-Works at Amsterdam. The process above described is new, and is the outcome of numerous researches carried out in recent years at the Loosduinen Gas-Works of the Hague. The experience obtained there with the old method of preparing ferrocyanide has put the author in a position to devise this new process, which utilizes the whole of the raw materials absolutely, and reduces losses to a minimum. Great expectations are entertained for this manufacture, which fills a special *rôle* in gas technology. Gas is delivered by this process absolutely free from cyanides, which is impossible of attainment with any dry cyanide extraction process.

General Staff Buildings.

For the accomodation of the stokers, spacious mess-rooms are to be erected at all the retort-houses, on the stage-level. Below these are to be lavatories, with hot and cold water supplies. Separate arches under the viaduct are utilized for the accomodation of 20 bath-rooms with douches, 20 lavatories, and 20 closets. The walls of the bath-rooms are of Siegendorf glazed stoneware, strengthened by the insertion of iron bands. At the entrance to the works is the managerial house, of two storeys, containing ten rooms used as offices, &c. Above the entrance is a tiled panel displaying the gas consumption. Offices for the occupation of the works foremen are provided near the meter-house, in the middle of the works. There is a spacious chemical laboratory near the workshops. The space behind the coal-store is available for storing pipes and connections; and for rough goods the arches of the viaduct and the space underneath the gasholder are used. For the rest of the materials, a store has been erected near the entrance. The assistant-manager, who has charge of the works, and the foremen are provided with three houses on the road to the north of the works. Pending other road communications, access has been obtained to the works by means of a temporary draw-bridge over the Trekvliet canal (see fig. 14).

The works described were erected in a short space of time. The plans were approved on Feb. 9, 1905, and a start was made with the erection on Feb. 25, 1905. Notwithstanding the unfavourable state of the iron industry for constructional work, the gas-works was ready to commence operations on Sept. 4 last. Only a few staff buildings and roads were then not quite finished. The cost of the works has amounted to 2,995,000 florins (about £249,585), and that of the site, roads, and mains 823,000 florins (about £68,585); or a total of 3,818,000 florins (about £318,170).

The Engineer responsible primarily for the working out and executing of the plans of the new works was Heer C. K. Visser; and the erection was carried on under his supervision. He is now acting as Assistant-Manager. The bye-products works were planned by Heer J. Rutten, who is now an Assistant-Manager in charge of this section. The Engineer responsible for the erection of the steam and electrical plant and the workshops and mechanical conveyors was Heer F. K. Th. van Iterson.

ELECTROLYSIS.

By Professor A. F. GANZ, of the Stevens Institute.

[Extracts from a Lecture delivered before the American Gas Institute.]

At the last meeting of the Institute, the Committee on Electrolysis, for which I had the privilege of acting as Consulting Electrical Engineer, presented a report which contained abstracts of the most important reports and papers on the subject of electrolysis from stray currents published in America and Europe, together with conclusions and recommendations for the protection of underground pipes, and also a brief outline of the theory of electrolysis. The reports of electrolysis tests which have been published since then show generally the same results as the ones which were quoted; and I can indorse the conclusions and recommendations reached by the Committee more strongly to-day than when they were adopted.

In the discussion of the theory of electrolysis, it is stated that wherever current passes from a pipe to ground electrolytic corrosion takes place, and that a mere fraction of a volt may produce corrosion. It has been claimed by others that a voltage below 1½ volts cannot produce corrosion because it is below the dissociation voltage of water. This, however, is a mistake, because when current passes from iron through ground to iron and produces corrosion, the counter electro-motive force is only a small fraction of a volt. If current should leave an iron pipe in ground containing certain alkalies, the iron would be in what is known in chemistry as the "passive" state, and oxygen would be liberated without producing corrosion. In this case there would be a counter electro-motive force of 1½ volts, due to the dissociation of water, opposing the flow of current in such passive places.

This passive condition of iron has also been put forward as a source of protection for iron pipes. The question has been investigated by Professor Haber, of Karlsruhe, who found that this passive condition of iron rarely exists in the case of iron pipes in ground. The electrolytic effect of current leaving passive iron would, in fact, be to change the alkaline to an acid condition, and so render the iron active—that is, subject to corrosion. If there should be both active and passive portions in a positive pipe, the current would leave largely in the active places, because in the passive ones there is the opposing electro-motive force of 1½ volts, so that a corresponding increased density of current and of corrosion is set up in the active places where there is practically no counter electro-motive force. I cannot see, therefore, that we can derive any encouragement for the protection of pipes from this theory of the passive state of iron.

A number of laboratory investigations on the effect of alternating current in producing electrolysis have also been published. These indicate that an alternating current will produce electrolytic corrosion which is very much dependent upon the composition of the soil, and which varies in amount from a fraction of 1 per cent. to possibly 2 per cent. of the corrosion produced by an equivalent direct current. It would appear from this that in certain cases, particularly in the case of lead pipe, even an alternating current may produce destructive corrosion. No experiences with stray alternating currents have, however, as yet been made public.

In Germany, a special form of electrode for measuring earth potentials (which does not introduce uncertain polarization potentials) has been used, and also a special apparatus for directly measuring the current flowing through ground. These were devised by Professor Haber, who has called them "non-polarizable electrode" and "earth ampere-meter" respectively; and he has used them in an extensive series of tests upon the piping system of Karlsruhe. A description of the electrode and earth ampere-meter, together with the results of these tests, was presented in a paper submitted to the German Association of Gas and Water Engineers, and published in their "Transactions" for 1906.* These devices have also been used with success during the past year in the tests carried out by the German Electrolysis Committee.

The mode of testing a piping system for stray currents is of considerable importance and interest to gas engineers. As this was not touched upon in the report of last year, I will in what follows endeavour to give an outline of suitable methods for making such tests, and also briefly describe the construction and uses of the new German devices. I will lay special stress on methods which will serve to prove that corrosion was due to stray currents, and to prove the origin of these currents so as to fix the responsibility, as this is important and essential evidence in the case of a lawsuit.

With the arrangement usual with trolley roads, of connecting the negative terminal of the generator to the rails, the general path of the stray currents is from the rails through ground to the pipes at places distant from the power-house, through the pipes, and from these through the ground back to the rails or to other return conductors in the vicinity of the power-house. Where current flows from a rail to a buried pipe, the rail assumes a positive potential with reference to the pipe; but where current flows from a buried pipe to the rail, the pipe assumes a positive potential with reference to the rail.

The first step in making an electrolysis survey of a piping system is, therefore, to measure potential differences between pipes and rails in a large number of places throughout the system, in order to locate these points of current-flow between pipes and rails. As gas-mains are not generally accessible, service or drip connections are used for making connection with the voltmeter. For this purpose, one voltmeter wire is clamped or otherwise fastened to the drip or service connection; care being taken to clean (with a file) the part where the wire is fastened, so as to ensure good metallic contact. The other voltmeter wire is best soldered to a rough flat file which is held on the rail for the contact, and which can be quickly removed and replaced when a car passes.

The voltmeter for these measurements should have a high resistance, so that an accidental poor contact at a drip or service connection will not seriously interfere with the measurement. A suitable instrument is a portable high-resistance Weston voltmeter with zero centre, having ranges of 1·5, 15, and 150 volts. Readings should be taken every 10 seconds for 10 minutes at each point, and the maximum, minimum, and average reading noted. The average readings are then conveniently marked on a map showing the principal pipes and tracks—red numbers being used where the pipes are positive to the rails, and black or blue numbers where these are negative. An excellent plan is also to plot these potential differences graphically upon a map on which the pipes are shown as lines, and using these lines for axes and the voltmeter readings for ordinates; and by shading the areas between the potential curves and the pipe-lines with red where the pipe is positive and with black or blue where it is negative to the rails, a clear representation of the potential distribution is obtained. If the negative bus-bar of the power station is connected to ground plates or to other buried metal as cable sheaths, measurements of potential differences between these and the pipes should also be made and plotted upon a separate map.

It will generally be found that there are definite regions in the neighbourhood of supply stations and of return feeder connections in which the pipes are always positive to the rails, and that there are other definite regions, remote from the first, in which the pipes are always negative to the rails. Between the positive and negative regions the potentials will be found to fluctuate from positive to negative. The existence of potential differences between pipes and rails, even if large, is, however, no conclusive evidence of stray currents, but indicates at what points current may be flowing from rails to pipes, and at what points it may be flowing from pipes to rails or other return conductors. A high potential difference is, in fact, usually a sign that there is a high ground resistance, and consequently but a small current flowing.

The next step is to determine the direction of the probable current flowing in the pipes. This is done by measuring potential differences between two points in a pipe by means of a millivoltmeter. A convenient instrument for these measurements is a zero centre Weston millivolt-meter with two scales, one of 10 and the other of 100 millivolts. These measurements may be made between drips or service connections 50 to 200 feet apart. They cannot be used, however, for calculating the current strength in the pipes, but only to indicate the probable existence and direction of the current. This direction of flow is then marked upon the map, together with the potential readings.

In making these tests, it is important that the connecting leads used with the millivolt-meter be rubber-covered wires, so as to have a good insulation and prevent the wire, if coming in contact with wet ground, from taking the potential of the ground and disturbing the readings. A good wire for this is No. 14 rubber-covered and double-braided wire. I remember one instance where we were measuring the drop along a cable sheath on a wet day, getting readings of from 1 to 2 millivolts. During one of these readings the needle suddenly ran off the scale, and a voltmeter which was substituted indicated 2 volts. We found upon investigation that the connecting wire was lying in water, that the insulation was defective, and that we were, therefore, getting the potential difference between the cable sheath and the surface of the ground, instead of the drop in the sheath.

A study of the map will show at what points determinations of current strength should be made. This is done by measuring the drop in potential between two points in the pipe by means of a millivolt-meter, and dividing this by the resistance of the included length of pipe. If this length contains one or more joints, the resistance must be measured, not estimated, because joints make contacts of extremely variable resistance. As this resistance measurement is troublesome to make, it is generally more convenient to measure the drop in potential between two points in one continuous length of pipe. With very large pipes and small current, this drop is a fraction of a millivolt, and requires a specially sensitive millivolt-meter, reading to hundredths of a millivolt for its measurement. The resistance of the length of pipe can be calculated from its dimensions and from an assumed figure for the conductivity. Mr. Maury, in a paper read before the American Water-Works Association, has given convenient tables for converting drop in millivolts directly into amperes of current for cast-iron and wrought-iron pipes. These tables are based upon a resistance of 0·00144 ohm per pound-foot for cast iron, and of 0·000181 ohm per pound-foot for wrought iron. The figures were obtained from measurements upon a large number of pipes, and they agree well with those given by others and with measurements made by the writer. To find the resistance of any cast or wrought iron pipe per foot of length, it is necessary to divide the above figures by the weight of the pipe per foot. A matter of great importance in making these current measurements

* See "JOURNAL," Vol. XCV., p. 578.

is to be sure to have perfect metallic contact between the pipe and the millivolt-meter wires. It will not do to use drip or other fittings for this connection, but contact must be made directly with the metal of the pipe. It is, therefore, necessary to expose the pipe where a current measurement is to be made.

I have made tests with various methods of making contacts for current measurements upon a rusty pipe, and have found that the presence of oxide may produce such a high resistance as to prevent a reading. I have also found that moisture can produce an electro-motive force due to electro-chemical action so large as to entirely offset the reading due to drop by the current. A satisfactory method is to use a pointed piece of steel about half the size of an ordinary lead pencil, with the connecting wire soldered to it, and provided with a wooden handle—the soldered joint being inside the handle. This steel contact is pressed against a spot on the pipe which has been previously filed bright. By far the best contact is, however, obtained by soldering the connecting wire directly to the pipe. This is particularly advantageous when readings are to be taken over a considerable time. The soldering should be done by means of a torch, and sufficient time allowed for the joint to cool to the temperature of the pipe before using it, as otherwise a thermo-electro-motive force may be set up, which disturbs the reading. When such contact wires have been soldered to a pipe, it is convenient, whenever practicable, to continue them with rubber-covered wires to the surface, or to some accessible point, and to terminate the ends in small iron boxes, such as drip-boxes. These wires are then available for future current measurements on the pipe without going to the labour of again exposing it.

These readings of current should be taken every 10 seconds for at least 10 minutes, and the maximum, minimum, and average readings noted. By tracing the flow of currents found in the pipes from these measurements, points can be usually located at which current must be leaving the pipes; and the pipes should be exposed here and examined for evidences of electrolytic corrosion. It must be remembered that all current which is found flowing in a pipe must leave it somewhere in order to return to the negative pole of the generator. This follows from the fact that every electric circuit must be completely closed so that every ampere which leaves the positive pole of the generator must eventually return to the negative pole, no matter how long or complicated may be the path through which it passes. Electricity is in this respect very different from gas or water, which latter may escape from a leak and diffuse through the ground. It is for this reason that stray currents represent no loss of electricity to the railroad, as is sometimes supposed, but on the contrary are a gain, inasmuch as the ground and pipes offer additional return paths for the railway current, and therefore mean less drop in the return circuit. It is for the purpose of taking advantage of the earth as a return conductor that railway power stations frequently use large ground plates connected to the negative bus-bar with heavy copper cables.

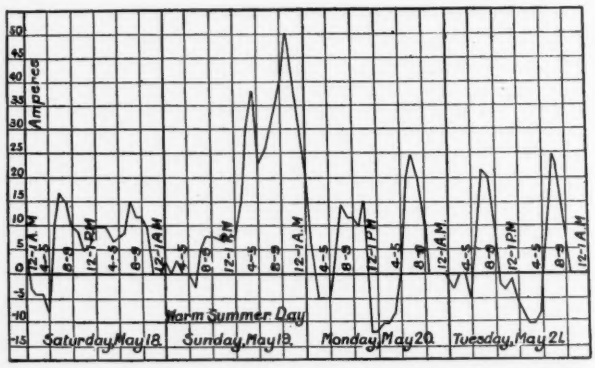
The previous brief outline of tests will serve to locate the points in the positive district in which there is the greatest danger from electrolytic corrosion; and these tests are relatively easily made and constitute the electrolysis survey as ordinarily carried out in America. There may, however, be many other endangered points which these simple tests will not reveal. Stray currents do not always take the simple path from rail to pipe, along the pipe and back to rail or other return conductor, but frequently take roundabout paths, passing from one piping system to a second, from this perhaps to a third. or passing across pipes, shunting round high-resistance joints, &c., producing electrolytic corrosion at every point of leaving the pipe for the ground. These points may exist in the negative, neutral, or positive districts, and are much more difficult to locate by means of electrical measurements.

The writer has in mind a striking case of this kind which he saw while witnessing some tests made by Mr. A. A. Knudson, in Rutherford (N.J.). A water-pipe crossing under trolley tracks was badly corroded, with all evidences that the corrosion was electrolytic. Yet this pipe was always more than one volt negative to the rails, and therefore could not be giving up current to them. Upon further investigation, it was found that an oil-pipe crossed the water-pipe several feet away in the ground, and that the latter pipe was highly positive to the former. It was therefore clear that the current which was producing the corrosion was leaving the water-pipe and entering the oil-pipe.

Wherever there are two or more independent piping systems —for instance, water and gas pipes—measurements of potential difference between these should be made to see if any points can be located where current is likely to be passing from one to the other. Current measurements must then be made in the pipes at these points, and plotted and studied as before. Measurements of current should also be made at every point where a pipe crosses a trolley track, or passes through particularly wet ground near trolley tracks, to see whether current is passing from one to the other, as these are particularly endangered points. For this purpose it is best to expose a length of pipe on each side of the track and to measure the current on each side. It may be found, however, that the current is so fluctuating that it is difficult to draw conclusions from the readings. The passing of a car may produce an entire change in the current conditions. I have found that the best way to make the test under these circumstances is to use one millivolt-meter in the pipe on each side of the track, and take simultaneous readings of current every 10 seconds for 10 or 20 minutes. The time of taking these readings should include the passing of a car. When these readings are plotted, it can be seen, by comparing the current curves, whether there is a change in the current in the pipe where it passes under the track, and, therefore, whether current is passing from pipe to rail or from rail to pipe at this point. The same method may be applied where it is desired to find out whether there is a change in the current flowing in a pipe between any two points in the pipe.

In making these simultaneous current measurements, it is very important that the two millivolt-meters have the same period of oscillation, as otherwise, with the usual fluctuating current, one would lag behind the other in its reading, and the instantaneous readings would no longer be comparable. It is desirable to use two exactly similar meters, and these should be strongly damped so as to move slowly enough to enable accurate readings to be taken even with a very fluctuating current. Another very important matter is the choice of time for making these measurements. The stray currents in the pipe will follow the load curves of the railway, and tests should be made at the time of heaviest load as well as at the time of light load. In a large railway system operating a number of stations, some of the stations may be shut down during periods of light load, and the current condition in the pipes be completely changed during these times. If the stray currents in the pipes are the combined leakage current from two or more railway systems, having different load curves, the current conditions in the pipes will also change during different times of the day, and perhaps also on different days.

In cases of this kind, a recording meter should be applied to a number of characteristic points in the piping system, arranged to record the current in the pipe. I have used a Bristol recording meter (a pyrometer instrument without its thermo-couple) to obtain 24-hour records of currents in pipes. The accompanying diagram shows the current in a gas-pipe for four consecutive days, obtained from four Bristol charts by estimating the average current for consecutive 1-hour periods, and then plotting the averages. The records for other week days were about the same as shown for Monday and Tuesday. The diagram for Sunday



Currents in Gas-Main (obtained from Bristol Twenty-four Hour Charts) by Estimating the Average Currents for One-Hour Periods.
Values above the Zero Line indicate the Flow towards the Works; those below, the Flow away from the Works.

shows that the current in the pipe was very large, and was flowing practically all day in the same direction. This large current is accounted for by the fact that the neighbouring trolleys were carrying a great crowd of Sunday excursionists. The following Sunday was a rainy day, and the record showed a much smaller current in the pipe. I wish to point out that the change in the direction of the current indicated in the week-day diagrams is an unusual condition, and is probably due to the changes in the operation of the power-houses producing the currents affecting the pipes.

These current records, by their agreement with the load curves of the trolley road, are frequently also used in serving as evidence that the currents in the pipes are trolley road currents. As the electrolytic damage is proportional to the time during which the current acts, it is necessary to have the time-curve of current in order to estimate the probable destruction. One ampere leaving an iron pipe for wet soil will remove 20 lbs. of iron in a year; but the same ampere of current in its path through the ground and pipes may leave the pipe and return to it any number of times—shunting, for instance, round occasional high-resistance joints, and removing iron at the rate of 20 lbs. a year at every point of leaving the pipe. The actual damage is also very much dependent upon whether the exit of current is concentrated in a small area or is distributed over a large one. Experience shows that the electrolytic corrosion ordinarily takes place in spots, producing pittings in the pipes, which indicate that the current must leave the pipes in these spots and not from the entire surface. The pipes are in this way much more quickly destroyed than if the corrosion took place uniformly over the whole surface. It is therefore an extremely difficult matter to estimate the amount of electrolytic damage; and such estimates will generally be too low, for the reasons given.

It is possible to trace the path of current through the ground by measuring potential differences between various points. An iron rod driven into the ground is often used for making contact

for such measurements. This, however, is not reliable, because the electro-motive force of polarization of the iron in wet ground is dependent upon the surface condition of the iron and upon the ingredients of the ground. It is not constant, and necessarily the same for each two rods in different parts of the ground. Where small potential differences are measured between two points in the ground, by means of iron rods as electrodes, entirely wrong results may be obtained because of difference in the polarization voltages at the two electrodes. To overcome this difficuty, a "non-polarizable" electrode was devised by Professor Haber. When two of these electrodes are used to measure the potential difference between two points in the ground, the two polarization voltages balance each other. The non-polarizable electrode is also used to measure the potential difference between a pipe or rail and the ground. It may be desirable to measure directly the flow of current through the ground, as between a pipe and a rail or between two pipes. The best arrangement for this is the "earth ampere-meter," devised by Professor Haber. I have made a number of laboratory tests with both the non-polarizable electrode and the earth ampere-meter, and have obtained exceedingly satisfactory and consistent results.

Where more than one electric road is operating in the vicinity of a piping system, the stray current in the pipes may be the leakage current from one, or it may be the sum of the leakage currents from all the roads. In cases where electrolytic damage has resulted, it is important to trace and prove the source or sources of the destructive current, in order that claims for damages and a demand to stop the current may be presented to the proper owners, and pressed in Court if necessary. This is fairly simple if it is possible to disconnect each power-house in succession for an interval sufficiently long to measure the effect upon the pipe current. If this cannot be done, indirect methods must be used, which may make the problem very troublesome, especially in cases where two or more roads use a common track for part of their line. Noting the starting, running, and stopping, and location of the cars on each line, and comparing these with the current curves in the pipes, will often help to locate the source or sources of the pipe current. Where the tracks of the different roads are independent, a good method is to attempt to measure the current flowing through the ground between pipes and the rails of each system by means of the earth ampere-meter. No universal method can, however, be given, because the conditions vary so widely. It is necessary to study each case separately, and adopt the methods best suited to it.

Of the attempted remedial schemes, the one most frequently applied to pipes in America is bonding in the positive districts to the negative bus-bar. While affording local protection, this greatly increases the amount of stray current—frequently producing electrolytic trouble in other portions of the piping system, as at joints; and the pipes themselves become a source of danger to other underground metal. In cases where there are variations in current flow, as is, for instance, illustrated in the diagram, no bonding scheme can be applied, as the positive zones keep shifting about. Insulating joints can only be used in special cases to effect a partial reduction in the stray currents in the pipes, and often do more harm than good.

I am convinced that in most cases there is but little, if anything, that the pipe owner can do to protect his pipes from these stray railway currents. The cure must, and in all fairness should, come from the railways. This is the attitude which the Germans have maintained ever since they have begun to study the problem. The question of the proper restriction to place upon the railroad in order to render underground piping reasonably safe from stray currents is a hard one to settle. In some places a maximum permissible potential difference in the rails, or between the rails and pipes, has been prescribed. The amount of stray current depends, however, just as much on soil resistance as on potential difference; and this resistance varies so largely that no maximum safe voltage can be prescribed for all cases, except one so low as to be entirely impracticable. The maximum allowable current in any one pipe is sometimes prescribed. This, however, is also inadequate. The only really safe condition would be a maximum allowable density of current leaving any one pipe for ground, expressed in milli-amperes per square foot of pipe surface. This is, however, very troublesome to measure, and the restriction would be difficult to enforce.

Transactions of the Italian Gas Society.—The minutes of proceedings at the Conference of this Society held last year at Bologna (of which an account will be found in the "JOURNAL" for July 2, p. 21) have recently been published. There are now 149 members of the Society, which was started in 1868. Among the questions of which the consideration is postponed till the next meeting (to be held this year in Venice), are the admission of water engineers into the Society; industrial diseases; regulations to be adopted in gas-works to prevent accidents; vertical retorts; and the taxation of mains. The minutes contain, in an appendix, observations by Sig. Ing. Alberto Pacchioni on industrial diseases, their definition, and the dangers of noxious gases. He suggests that large representative gas-works, such as those at Milan, Turin, Venice, Bologna, Genoa, Florence, Rome, Naples, and Palermo, should collect proper statistical records relating to any special dangers to the health of the workers. Sig. Ing. M. Böhm also contributes a short account of last year's second meeting of the International Photometric Committee at Zurich.

MANCHESTER JUNIOR GAS ASSOCIATION.

Annual Dinner.

The Eighth Annual Dinner of the Association was held at the Mosley Hotel, Manchester, on Saturday evening. There was a good attendance of members and guests. The PRESIDENT (Mr. E. J. Wellens) occupied the chair; and among those present were Messrs. Meunier (Stockport), Duxbury (Oldham), Councillor Simpson (Hebden Bridge), and other gentlemen.

The toast of "The King" having been duly honoured,

Mr. R. H. GARLICK gave "The President." He said that Mr. Wellens had been instrumental, to some extent, in forming the Association; he being one of the members of the class which Mr. Ashworth and others taught. The original Gas Students' Association had between twenty and thirty members; and now they had Mr. Wellens presiding over an Association with 116 or more names on its roll of membership. He knew their President to be a very energetic, indefatigable, and conscientious man. Imbued with a love for his profession and a becoming ambition, he had worthily risen to the position he now held. Mr. Wellens was a living example of dogged perseverance which would carry him to a high position in the gas profession.

The toast was drank with musical honours.

Mr. WELLENS, having read a number of letters of apology from gentlemen unable to be present (including one from Mr. Hill, the President of the Yorkshire Junior Association), said he had not yet settled down to the shoulder work of an Association like that of which he occupied the presidential chair, and should feel better suited for the position when his year of office closed. So far as they had gone, the session had been important. They had held the first joint meeting of the Junior Gas Associations of England, which would no doubt be well within their recollection. There were 250 members present at the meeting at the great Gas Exhibition in Manchester. This exhibition, and the number of gas engineers and persons who attended it, showed that the gas industry was not dying out, but was progressive. They had a large number of young men in the country spending their time in order to improve themselves for the profession. Their object was to benefit the industry—not for any particular centre, but for the whole country. In this respect they were receiving every encouragement. They were recognized by the older and kindred Associations; and representatives from some of these were present. There was to be an important meeting of their order at Birmingham next Saturday, which their Secretary (Mr. A. L. Holton) and himself were attending on behalf of the Association, besides other representatives of Junior Associations, which showed the esteem in which these organizations were held. He thanked them sincerely for electing him to the presidency. He considered it a high honour to hold it, and trusted they would have no cause to regret his election. He concluded by expressing regret at the absence of the Secretary on account of illness, and said that Mr. Holton deserved their sympathy.

On the proposition of Mr. R. H. GARLICK (the Treasurer), who testified to the satisfactory condition of the finances of the Association, a vote of condolence with Mr. Holton was unanimously passed.

The PRESIDENT said two members of the Association had kindly come forward with medals for presentation to the readers of the best papers during the past session. Those medals had been awarded, and would now be presented. The first prize—a gold medal—had been won by Mr. L. D. Mosley, now Engineer and Manager of the Seaford Gas Company, for his paper on "Incandescent Street Lighting." Having recently gone to his new sphere of labour, Mr. Mosley was not able to be with them; but he (the President) would ask Mr. Hollingworth to forward the medal to him.

Mr. D. V. HOLLINGWORTH said he accepted the trust with pleasure. Putting himself in Mr. Mosley's place for the moment, he thanked the donor for the magnificent prize which had been awarded. Mr. Mosley would esteem it as highly as he (Mr. Hollingworth) did on his behalf. It would be one of his most valued possessions. The Council had been unanimous in their award. The paper Mr. Mosley had read was worthy of it.

The winner of the second prize—a silver medal—was Mr. R. H. Garlick (Salford), for his paper entitled "Observations on Distribution."

The PRESIDENT, in making the presentation, said that Mr. Garlick was sufficiently known to the Association to render it unnecessary for him to expatiate on his good qualities.

Mr. GARLICK said he should esteem the medal very highly. He had produced his paper at short notice, and on lines calculated to produce discussion. He had consequently prepared himself to answer any question that might be put to him. He rejoiced that Mr. Mosley had gained the first prize; and, personally, he should have been prepared to give up the second to anybody else, if there had been a third. He had tried to improve the Association. Such organizations were a power in the gas industry. The members of them had brains and intellect, which only required development and encouragement to produce still better results in gas engineering.

Mr. F. THORP proposed "The Guests," and said he was glad to see members of Senior Associations with them, including the President-Elect of the Manchester District Institution.

Mr. DUXBURY was selected to respond to the toast. He claimed a sort of relationship with the Association—the President having, he said, been one of his respected students. It was better alike for the Senior and Junior Gas Associations that both should be represented on the Councils of each. It had been said they had brains. This was shown by their career. They had qualities which only wanted bringing out. Some had been, and were now being, brought out. They were always learning; and the older Associations would be able to learn something from the juniors. The Gas Exhibition in Manchester was one of the most successful ever held. It was an education to all of them—a great school; and it was to be regretted that it did not run on another week or ten days. There was not time for some of the seniors to see and examine all there was on view. There ought to be a similar exhibition in some Yorkshire or great Midland town. They had present the two Secretaries of the exhibition, who had rendered signal service in the matter, and to whose energies its huge success was largely due. There was plenty of love between the Senior and Junior Associations. All such Associations should be helped on. There should be perseverance and patience on the part of the young, and encouragement on the side of the old.

Mr. MEUNIER proposed "The Association." A Junior Association, he said, meant that the older Associations were being forced forward by them. At the same time the Juniors were deserving of all the efforts made on the part of the Seniors to help them in striving to push forward the whole gas industry. The Juniors had come on in force; and the Seniors were glad to have their assistance. At the same time, prudence should be observed. It might be, as had been suggested, that it would perhaps be better for the Junior Associations if they met only once a quarter instead of once a month; and he agreed to a certain extent with the suggestion. But, after all, their Associations, whether Senior or Junior, had only one aim—the general and highest progress of the gas industry.

Mr. HOLLINGWORTH acknowledged the toast. He said that the kindly feeling on the part of the Senior Association expressed by Mr. Duxbury was, he could assure them, fully reciprocated. Their thanks were due to the gas engineers present, and to those who were not with them, for giving the juniors permission to visit their respective works. It was deeds, not words, that were wanted; and he hoped a little half hour now and then would be granted to the juniors to help them to prepare papers tending to maintain the dignity of the profession.

Mr. R. H. GINMAN gave "The Health of Mr. James Simpson, the Chairman of the Hebden Bridge Gas Board," and spoke in high terms of his character in private and municipal life.

Mr. SIMPSON, in reply, gave the reasons which led the District Council to appoint Mr. Wellens to the position he occupied at Hebden Bridge, and said they would keep him as long as they could. He was afraid, however, the Engineer's services would be sought for in some larger, if not more important, centre.

Between the speeches, and after the toast-list had been completed, a long programme of musical items and recitations was gone through; the performers being for the most part members of the Association.

SCOTTISH JUNIOR GAS ASSOCIATION.

EASTERN DISTRICT.

Visit to Messrs. R. & A. Main's Works at Falkirk.

The members of this section of the Association paid a visit, on Saturday afternoon, to the Gothic Works, at Falkirk, of Messrs. R. & A. Main, Limited. The party numbered forty-five. They were received by Messrs. Robert B. & A. P. Main, who, with Mr. T. M'Ewan, the commercial representative of the Company, showed them round the establishment. It was first explained that the works occupy the site of a Roman station—on the confines of the Roman Empire—and that, in the excavation for the foundations of the buildings many fragments of articles of Roman manufacture were found. The place where the works were situated was at one time a residential fort, in which a better class of people seemed to have lived. Another interesting historic association of the district was that it was upon this spot that King Arthur fought his last battle. On Saturday the visitors were first of all shown the making of moulds. The immense number, consequent upon the variety of the articles required, was a great surprise to the onlookers. Among the productions looked at in this department was an oven, to be heated by gas on a regenerative system, for use by tailors, and, as a matter of fact, already much employed in large establishments. It was explained that by this oven a saving of one-third in the quantity of gas required is effected. The regenerative method of firing is being successfully applied to the larger roasting and baking ovens. In the moulding-shop there is accommodation for 130 moulders. Here the work was shown of preparing and running the mould. Afterwards the work in progress in the finishing, fitting, plating, and enamelling shops was shown and explained. It was of very great advantage to the visitors that Messrs. Main had been able to get a number of their men to remain for the afternoon, and that the works were thus seen in what was, so far as the strangers were concerned, full operation. Interest in the later stages of the work centred in the plating and enamelling. Plating may be done in three metals—nickel, bronze, and brass—with any one of which a high finish can be put on. Enamelling is done in some 22 different colours; the process being carried through in chambers heated to 2000° Fahr. One of the latest productions of the Company—an open fire for the burning of coke—was shown at work. A flue behind the fire-box is so arranged that it maintains a constant draught front to back, and keeps the mass of the material, which, on this occasion, was Falkirk gas coke, in a continuous glow. The inspection of the works occupied fully two hours, and there was no time left to take note of the buildings, further than that they are spacious, and that there is abundance of room for extension.

Tea was served in the office—Mr. R. B. MAIN presiding.

The CHAIRMAN expressed the appreciation he and his brother had of the honour the Association had conferred upon them in visiting their works. When they considered the number of firms engaged in the same business, they would have an idea of the importance of the industry. It was an immense one, as they would see when he told them that nine-tenths of the Company's whole business there was connected with the gas-stove trade. Twenty-five years or so ago it was a most difficult thing to sell a gas-stove; but in this respect times had greatly changed.

Mr. A. P. MAIN concurred with his brother in extending a hearty welcome to the Association. He said he was thoroughly convinced that they were only on the fringe of the gas era. There was going to be considerable advances in the manufacture of gas through great economy in the cost of production. Gas would be of lower quality; and probably within the next quarter-of-a-century it would be found that it would be applied at a very much higher pressure—one which would surprise many at the present day. The high pressure, he believed, would ultimately come to be put on at the gas-works for all purposes. Manufacturers of gas-heating apparatus had an immense amount to learn. There, again, they were only on the fringe of the whole subject. He did not know what would be the method of heating by gas a quarter-of-a-century hence; but they might depend upon it that nothing would repay young men more fully than the application of their minds to gas-heating problems. It was not unlikely that they would have legislation upon the subject of the purification of the air in large towns. Matters were tending in this direction; and when the time came, there would begin a greater era for gas. He believed the gas engineers of the future would be equal to the occasion. It rested on such men as the members of their own Association, who were coming to the front, to keep these views in mind. Let them remember that they were not by any means associated with a dying industry, but with one which had as yet only touched a portion of the field it was destined to cover.

The PRESIDENT (Mr. D. Bisset, of Granton), in proposing the thanks of the Association to Messrs. Main, said they were very much indebted to manufacturers of gas appliances and plant for the way in which they kept up to date with the industry. Great strides had been made during the last half-dozen years in the use of gas for illuminating purposes, with the result that they were now getting six, seven, or eight times the amount of light from a given volume of gas, compared with what they formerly obtained from the flat-flame burner. This was something they ought to be proud of. He was not sure that they had made the same progress in the application of gas to heating purposes; and there was a large field open in this direction. It was perhaps a dream that a time would come when there would be no solid fuel used in dwelling-houses, but that it would all be taken from the gas-works in pipes. Gas engineers were striving to attain this end; and they were being backed up by such people as their hosts. The members could not but admire the handsome and well-equipped works they had seen that day, and also the fine productions turned out. The works had been most kindly thrown open to them, and every question they asked was answered frankly and freely. They would go back to their own vocations with increased knowledge, derived from their visit. He asked them to accord a hearty vote of thanks to Messrs. Main for the generous way in which they had received and entertained them.

Mr. J. DAVIE (Edinburgh) said they were all very glad to find Messrs. Main supported by so excellent a staff. There was a parrot-cry—perhaps not so much heard now as it was ten years ago—about technical education in Germany; but it occurred to him, when he was being conducted through the works, that they had nothing to fear in this direction, because they had met there men who could tell them all about everything that was being handled. He thought that with such men the business was in safe hands. Each and all of them, from the officials down to the workmen, displayed an interest—almost a scientific interest—in their work. The members were greatly indebted to them for the information they had given.

The HON. SECRETARY (Mr. John R. Moyes, of Granton) also expressed the indebtedness of the Association to Messrs. Main. He said the visitors had seen things in the works they had just inspected which they would not readily forget. There was a great deal to learn, however; and he hoped the members, encouraged by their reception on such occasions as the present, would go forward, endeavouring to do their best in the work which lay to their hands.

The proceedings were then brought to a close.

The Heating of Hospitals.—A paper on "Some Methods of Heating adopted in Hospitals and Asylums recently Built," prepared by Mr. Ernest Richard Dolby, is announced to be read at an early date before the Institution of Civil Engineers.

PREVENTION OF ACCIDENTS IN GAS-WORKS.

More Suggestions from America.

In the "JOURNAL" for the 7th ult. (p. 40), we gave some extracts from a report by a Committee of the Michigan Gas Association on accidents occurring in connection with the gas industry; dealing specially with those incidental to the actual manufacture of gas. We now reproduce the Committee's remarks on accidents which take place in the course of subsequent operations.

Exhausting, Condensing, and Scrubbing Gas.—It has frequently happened that, from one cause or another, exhausters have pulled enough air to cause serious trouble. To detect this, nothing is really better than to keep a common jet photometer burning constantly in the foreman's office. There should always be duplicate exhausters. Recording gauges on the inlet and outlet of all exhausters are necessities. All seal overflow pots should be covered with a loose metallic cover, and all seals made up with ties and plugs, so that the overflow may be watched, and also have a shut-off cock. Scrubbers and condensers should be equipped with a permanent iron ladder. The inlet and outlet pipes of all scrubbers and condensers should be piped to a common pressure-board. Pressure-lines should be run of not less than ¾-inch pipe, and should be provided with small cocks for testing and draw-off purposes. Recording gauges located at various critical points are of inestimable value in locating and preventing trouble; and no works can afford to be without them. Condensers and scrubbers should be thoroughly steamed out before being opened for cleaning. Electric extension cords for this work should be metal protected; and, as far as possible, their use should be forbidden and mirrors substituted. Respirators should always be used when it becomes necessary to enter a scrubber or condenser.

Purifying.—Probably more serious accidents have occurred in the purifying plant than in any other division of a gas-works. The most certain way to prevent purifying-house explosions is: "Don't build the house." Are we consistent when we store our gas in holders exposed to all the extremes of heat and cold, and at the same time put a roof and four walls round our purifiers? Water-seals can be heated in the winter, and with the modern dry box this necessity is overcome. As protection from the weather for the workmen while changing boxes, a cheap, light roof is all that is necessary. They will work far more safely and more comfortably in the open than in a close-walled, and poorly-ventilated building. Some English engineers are erecting over their boxes a movable roof, which moves along over the boxes much after the manner of the carriages that raise and lower the covers. Stop building houses, and put this money into something else, where it will not do so much damage. For those who have had the purifying-house thrust upon them, most of the accidents have been due to defective lighting. Marine electric wiring with outside switches is the modern practice. Globes should be vapour-proof, and protected by wire guards. Still safer is the lighting by means of outside electric lamps, provided with reflectors which throw the light inside. Extension cords should be avoided as far as possible; and where they must be used, they should be carefully inspected, and the lamps provided with a wire guard. Safety seals on the inlet lines to the purifiers are advisable; but they must be carefully inspected and regularly tested. Leaky centre-seals and valves often prove very troublesome, and are dangerous when boxes are being changed. These should be repaired at the earliest opportunity, and stoppers and vents should be used. Pressure-gauge boards should be installed in every house, and the gauge-lines carefully and properly run. New oxide, liable to fire, should be removed at once from the building, and a fire-hose kept in readiness where trouble is anticipated.

Metering.—The accidents to be guarded against in this department are cases of asphyxiation. Meters shut down for repairs should be thoroughly steamed out, and should never be entered without the use of a respirator.

Storing.—Gasholder cups should be inspected daily; and the rollers and guide-wheels oiled and examined at regular periods. Rubber belting over the cups will prevent sudden gusts of wind sweeping the water from the cups, and save steam enough in one winter to pay the cost of the installation. Steam is generally used, though hot water has been suggested. The risers should be open at the bottom into the tank, and be each provided with a separate shut-off valve. Steam-nozzles must never dip into cups deep enough to unseal them in case of back-syphoning. Check-valves for this work are unreliable. Snow-guards for the tank save much heat. Wet snow driven against the guide-rails will sometimes freeze and cause trouble by blocking the rollers. Holders must be kept well painted.

Governing and Bursting.—Every Foulis governor depended upon to supply all, or an appreciable part, of the city pressure should be equipped with a safety bye-pass, automatic in action. A break in the air-line of a Foulis governor will cause it to shut off completely. Fluctuations or "jumping" of a Foulis governor may be stopped by using glycerine in the dash-pot. Every pressure-recording gauge should have a U-gauge by its side for purposes of comparison. Holder outlet valves should be locked.

General Works Precautions.—All drips should be equipped with a test-pipe. A printed form should be filled each day by the workman pumping drips, giving their condition before and after the operation and the quantity of water pumped. "No Smoking" signs should be posted conspicuously in all dangerous places. Men should be instructed to pick up nails, and posted warnings of the danger from nails are found effective. Oil-tanks should be carefully vented. In many cities, these tanks have to be placed in brick or concrete pits; and this should always be done.

Lighting.—The plant should be thoroughly (even extravagantly) lighted inside and out. Light prevents accidents and removes dirt. Electric arcs outside and inside, where there is no danger of explosion from the gas leaks—as boiler-room, generator-room, and retort-house—with marine electric wiring where safety demands, are best. A gas-works is the worst possible factory to light satisfactorily with gas. Gas arcs, wall lights, and open burners may be used; but, in the writer's experience, they are far from being satisfactory. All inside walls and much machinery should be covered with a coat of whitewash. It will lighten up the darkest hole wonderfully. Small books, containing rules, suggestions, and precautions, are excellent. A careful daily inspection of the works by the superintendent or his assistant is probably the best way to prevent accidents.

Distribution Department Accidents.—By far the larger number of accidents in the gas industry occur in some branch of the distribution department. Of these accidents, probably two-thirds are directly due to the ignorance and carelessness of the general public, one-fourth to negligence and violation of rules on the part of the company's employees, and the remainder to unavoidable and natural causes. They are largely cases of asphyxiation, explosion from leaks or careless operation of appliances, fires from gas-burners, and damage done to property by careless workmen. All are due to human imperfection; and they will continue to happen so long as the man who looks for a gas leak with a match continues to inhabit this sphere. This class of accidents has been divided, for convenience of reference, into those happening in (1) companies' shops, (2) on the distributing system, and (3) on consumer's premises. As accidents in these three divisions are of a very similar nature, they will be considered as a whole.

Most of the precautions to be taken to prevent accidents consist in careful instructions to workmen and a thorough inspection of all work done. The "follow-up" system on installations and complaints is to be recommended. Here are a few "don'ts" which it is well to bear in mind in this connection: Don't fail to uniform your men; don't neglect to place a flue connection on all hot-water heaters; don't instal swing brackets on walls in such a manner that the burner may be swung back against the wall; don't fail to provide your men with respirators and an emergency gas asphyxiation kit; don't neglect to thoroughly protect all street openings; don't fail to ventilate all governor vaults.

Dealing with accidents common in, but not peculiar to, the gas industry, the Committee make the following remarks.

Machinery, Elevators, &c.—Guard-rails should be placed round fly-wheels and moving parts of machinery. Gears should be provided with shields, and engines with automatic governor stops. Automatic positive lubricators will prevent many accidents. There have been many elevator accidents reported by the gas companies. Elevator shafts should be so built and protected (preferably by wire mesh) that there are no projecting parts to catch a man; and elevator gates must be installed. Car-locking devices, which hold the car in position on the platform while the elevator is in motion, are a necessity. Inspection should be contracted for; and it should be frequent and thorough. Elevators should be well lighted. Dispense in every possible way with the use of ladders. Build stairs or permanent iron ladders with hand-rails to all elevated points that demand constant access. Have buildings designed by a competent architect, and place a reliable inspector on the construction.

Fire and Fire Protection.—Make all new buildings of absolutely fireproof construction. Do not erect four brick walls, then put in wooden floor, stairs, and closets, top it off with a wooden roof, and think you have something that will not burn. Fireproof means steel, with concrete floors, iron stairs, and metal or concrete roof. Walls may be either brick or concrete. Do not use wood anywhere for any purpose. The first cost is slightly higher; but the annual saving in insurance will more than make up this difference, and you can sleep at nights when the city fire-bell rings. Replace wooden floors with concrete, wooden stairs with iron, wooden lockers with metal. Keep oils, grease, &c., in a separate fireproof building. Provide metal cans for waste, greasy rags, and rubbish. Put a pail of sand and fire-buckets in every room. Have fire extinguishers recharged once a year. Have a separate fireproof building for hose-cart and fire apparatus. Have plenty of hydrants and fire-taps. See that there is ample pressure and sufficient water for fire purposes. Instal fire sprinkler heads. Ammonia water or a solution of washing soda is a very excellent extinguisher for oil, tar, or grease fires. Do not use your fire apparatus for anything except fire.

Method of Handling Accidents.—Most companies carry accident insurance. While this is a protection financially, the fact that some one else will pay the accident bills has a decided tendency to make companies careless as to accident precautions and prevention. A number of companies have adopted the plan of laying aside each year a fixed accident fund, which may be either a certain percentage of the pay-roll or of the gross earnings. This plan would seem to have many advantages; and certainly the stimulus then is towards the prevention of accidents. Every company should have on hand in the different departments at all times a complete "First Aid to the Injured" cabinet, and one or two persons carefully instructed in its use. A doctor's and

hospital list should be printed and posted permanently beside the works and distribution department telephones. Some companies pay a physician an annual retainer for (and this doctor handles all) their personal injury cases. Many companies have an adjuster, who acts for them in all accident and damage cases. Every company should have someone of this kind. It is his duty to get upon the ground and obtain all the information possible regarding the case. This is very important, and will often save the company much future expense and annoyance.

STRESSES IN DAMS.

At the Meeting of the Institution of Civil Engineers last Tuesday week, three papers dealing with this subject were read. The first was entitled "Experimental Investigations of the Stresses in Masonry Dams subjected to Water Pressure," the authors being Sir John W. Ottley, K.C.I.E., and Dr. Arthur W. Brightmore; the second, "Stresses in Dams—an Experimental Investigation by Means of India-Rubber Models," the joint production of Messrs. John S. Wilson and William Gore; the third, "Stresses in Masonry Dams," by Mr. E. Prescot Hill.

The experiments described in the first paper were carried out in the shops of the late Royal Indian Engineering College at Coopers Hill, and occupied about 14 months. They were restricted, for reasons given, to models of a dam of typical triangular section under perfect conditions; and the results obtained were submitted as a contribution to existing knowledge on the subject of the arrangement of stresses in masonry dams subjected to water pressure. The models were made of "plasticine," which appeared likely to reproduce on a small scale many of the conditions existing in a full-sized structure.

The dam was first modelled of triangular section, with the vertical face exposed to the pressure of the water; the base being made equal to the height divided by the square root of the specific gravity of the "plasticine," so that the resultant of the pressure on the base (due to the weight of the model dam itself and the pressure of the water) would act at one-third of the width of the base from the outer toe. The height of the model was taken at 30 inches, which gave a base of 26 inches. The length of the dam was 12 inches. In subsequent experiments, the width of the base was reduced to 23, 20, and 17 inches; while in one case a sloping face was adopted. The model was moulded in a frame furnished with thick plate-glass sided; and water pressure was applied to the face of the model by water contained in a thin rectangular india-rubber bag made to fit the frame.

The weight of the model as first made (with a 26-inch base) was 230 lbs.; the water pressure on the vertical face being 195 lbs. This gave an average value for the intensity of normal pressure on the base of about 0·74 lb. per square inch, and an average intensity of shearing stress over the horizontal base of about 0·62 lb. per square inch; thus keeping well within the elastic limit of the "plasticine"—*i.e.*, 2 lbs. per square inch.

The displacements of the originally vertical and horizontal lines were shown in various diagrams submitted. The first represented the condition of affairs after the water pressure had been left on for one day. After these measurements had been taken, the water was syphoned off, and in the course of a few days the model entirely recovered its original form; thus showing that the material was elastic under the pressure to which it had been subjected for the comparatively short period of one day.

More important results were obtained when the water pressure was left on for a longer time so as to allow the model to become permanently deformed owing to its plasticity, as it thus became possible to show more definitely the distribution of the stresses in the structure. After the water pressure had been left on for 33 days, this deformation was very marked—a crack at the inner toe having commenced to appear after seven days.

After detailing the method of calculation adopted, the authors stated that both the recorded displacements of the lines on the model and the calculations based on these indications showed that, though the old assumption that the shearing stress is proportional to the normal stress does not hold good at the base (because the dam is "fixed" at that level), yet at higher levels it is approximately correct, and that therefore the shearing stresses to be provided against are not those at the base, but at rather higher levels near the outer profile.

It was also pointed out that, though a dam may be designed so as to have no tension on the horizontal plane at the inner toe when subjected to water pressure, still there are tensions on other planes passing through that point; and it was suggested that the plane of maximum tension at the inner toe could be made more vertical by tying the front part of the dam into the foundation below the level of the base.

The permissible values of compressive and shearing stresses in dams were then considered, and the following final conclusions were drawn: (1) If a masonry dam be designed on the assumption that the stresses on the base are "uniformly varying," and that these stresses are parallel to the resulting force acting on the base, the actual normal and shearing stresses on both horizontal and vertical planes would (in the absence of stresses due to such factors as changes in temperature, unequal settlement, &c.) be less than those provided for. (2) There can be no tension on any plane at points near the outer toe. (3) There will be tension on planes other than the horizontal plane near the inner toe; the maximum intensity of such tension being generally equal to the average intensity of shearing stress on the base, and the inclination of its plane of action being about 45°.

In the introduction to the second paper, reference was made to the mathematical and experimental investigations of the problem already made by Mr. Levy, Professor Karl Pearson, and Mr. Atcherley. The description given by the late Sir Benjamin Baker, at the Institution, in the discussion on the Coolgardie Water Supply, of experiments he had made with jelly models of dams, suggested to the authors the possibility of making exact experiments with models of india-rubber. Their paper was divided into seven sections; and the following are some of the conclusions arrived at: (1) Tensile stresses may exist at the up-stream toe of a dam, notwithstanding the fact that the line of resistance lies well within the middle third. The tension may be reduced by (*a*) making the up-stream face vertical, or by otherwise increasing the weight of the dam towards that face, which would have the effect of increasing the stresses in the dam when the reservoir is empty; (*b*) by a general increase in the dimensions of the dam; (*c*) by placing an earth embankment against the down-stream face. (2) The direct stresses at the down-stream toe are compressive in every direction, but reduce to zero in the direction normal to the face. (3) The maximum compressive stresses in a dam above its foundations are in a direction approximately parallel with the down-stream face and generally some distance therefrom. (4) The shearing stresses are considerable at or near the up-stream toe. They are a maximum a short distance from the down-stream face, in a plane approximately at 45° to the face. (5) The stresses in the foundations are of less consequence than in the dam above the base, because of the lateral support and the more extended distribution. (6) The stresses are considerable at the toes of a dam if they form sharp angles with the foundations. These stresses may be reduced by replacing the angles with curves of large radii. The curve at the up-stream toe may take the form of a rounded quoin, cut in large stones, so as to avoid joints in the masonry normal to the direction of the greatest tensile stress.

In the third paper, the method of determining stresses started with the assumption by the authors that the vertical pressure on the base varies uniformly from one side to the other. From this assumption principal stresses were derived, the magnitude and direction of which varied considerably from the stresses calculated by the method hitherto adopted.

REGISTER OF PATENTS.

Manufacture of Retorts.

COLLINS, H. A. D., of Savoy Court, Strand.

No. 800; Jan. 11, 1907.

This invention (relating to the manufacture of retorts for gas and other furnaces) consists essentially in making them in longitudinal sections moulded under pressure "whereby the retorts are rendered harder and more durable than when manufactured by the existing process." The retorts are formed in two parts—top and bottom—the divisions or joints being at the sides and rebated so as to fit one upon the other. The sections can be moulded singly, and in this form subjected to pressure and then burnt. The invention is said to be especially advantageous when silicious matter is used in the manufacture of the sections.

Incandescent Gas-Burners.

KRATKY, F., of Vienna.

No. 1577; Jan. 21, 1907.

This invention relates to incandescent gas-burners (inverted and upright), and refers more especially to a regulating disc which is adapted to be moved away from and towards the rear external mouth of the mixing-chamber. The object sought (according to the type of the draught and protective glass chimneys used) is to enable the mixing air and the combustion air to be fed to one point only of the burner, and also, according to the distance of the disc from the mouth, to determine the cross sectional area of the air inlet or effect the regulation of the air supply. Furthermore, it acts as a wind guard, and, in the case of inverted lights, it serves to prevent foreign bodies falling into the mixing-nozzle.

Gas-Cookers.

WRIGHT, J. W. B., and DARWIN, H., of Birmingham.

No. 3133; Feb. 8, 1907.

This invention relates to the arrangement of the carriers of the cross-bars of the hot-plate of a gas-cooker whereby the burners located beneath it are made readily accessible without the necessity of removing the cross-bars individually. Hitherto, the patentees state, this has been usually effected either by hinging the whole of the hot-plate to the body of the cooker, or by arranging the burners upon a sliding tray. It has also been previously proposed to carry the cross-bars upon

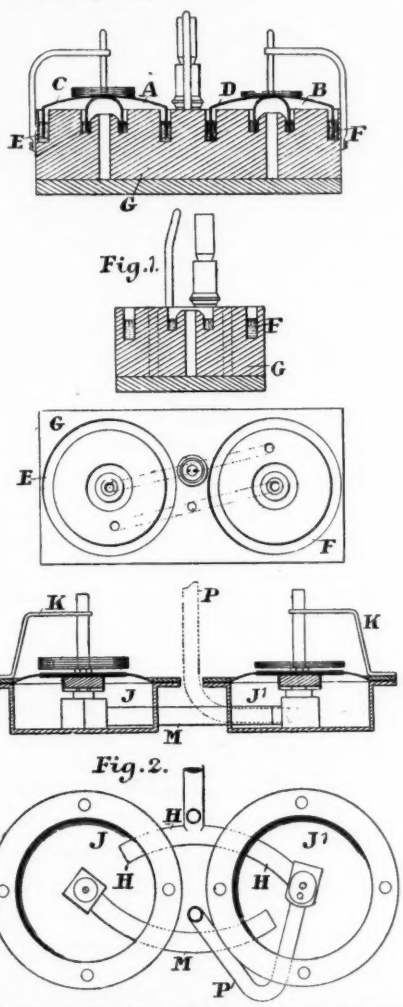
triangular frames, the ends of which have been connected to the hot-plate (to admit of removal), by open-topped hinges, or have been otherwise suitably attached. Also the cross-bars, together with the burners, have been carried by a frame which is hinged at one side to a fixed part of the hot-plate. This, however, does not admit of access (for cleaning or other purposes) to the upper sides of the burners, as the latter move bodily with the cross-bars and frame. According to their present invention, the cross-bars are carried by a separate hinged frame or frames, independent of the burners, and detachably pivoted at the opposite sides of one end to the hot-plate frame by means of closed-topped bearings in the one part which engage with pivots on the other part—the pivots being detachable or removable from the bearings, so as to admit of the removal of the frames when required.

Lighting and Extinguishing Gas-Lights by Varying the Pressure in the Mains.

HEPBURN, J., of Moffat, N.B.

No. 5478; March 7, 1907.

This invention—"means for automatically lighting and extinguishing gas-lights by varying the pressure in the mains"—is shown in two modified forms in the engravings.



Hepburn's Lamplighting and Extinguishing Appliances.

Fig. 1 shows two sectional elevations of one form at right angles to each other, and a plan with certain portions removed. Fig. 2 is a sectional elevation and plan of one modification.

The appliances are all actuated by gas in a similar manner. In fig. 1 a mercurial seal is employed; in fig. 2 there is a diagram in lieu of the mercurial seal; while in still a third arrangement there may be a water seal instead of a mercurial seal or diaphragm.

As shown in fig. 1, the appliance consists of a high-pressure chamber A and a low-pressure chamber B. Gas enters from below and passes along ports to the chamber A and its sealing cup. This chamber is provided with the vertical sliding dome C, while the chamber B has a vertical sliding dome D. The former is weighted by disc weights to suit the night pressure of gas, and thus becoming the high-pressure chamber. The dome D is weighted with disc weights to suit the day pressure, and thus becoming the low-pressure chamber. Both domes depend and work within mercurial seals E and F respectively, formed in the body casting G.

Within the domes at the centre, and depending from them, are internal inverted sealing cups, which also depend within mercurial seals formed in the body casting G. Secured to the domes are spindles, which, along with the domes and weights, are allowed to rise—the rods being guided by brackets. The dome of the high-pressure chamber A is weighted to suit the night pressure (say, 25-10ths), but so as to allow the cup to entirely close the port below. The dome of the low-pressure chamber B is also weighted, but to suit the day pressure (say, 10-10ths to 15-10ths), but also to allow the cup to entirely close the port below it.

The gas on entering passes up to the chamber A, raising the dome C and its cup. The gas thence passing down the various ports to the chamber B, and with its extra pressure raising the dome D with its cup, and allowing the gas to pass up the port to the burner. The gas thus flowing to the burner is lighted by the pilot light. As soon as the lamps are lighted, the pressure in the mains is again lowered to normal, whereby the dome C drops and cuts off the supply of gas.

To extinguish the lamps the gas is reduced to the day pressure, which causes the dome D to drop and close the ports.

Referring to fig. 2, which shows a diaphragm arrangement in lieu of the mercurial seal, the operation is similar. Gas is supplied from the main to the pipe H, and passes to the well-dish chamber J and to the port beneath the valve of the chamber J^1. The gas is free to enter the chamber J and its port; and when the pressure is increased to (say) 28-10ths to 30-10ths, it will lift the diaphragm and valve fixed to it, thus allowing the gas to pass through the pipe M to the chamber J^1, whereby its diaphragm is lifted, along with the valve fixed to it, so as to allow the gas to pass up the pipe P to the burner. The gas thus flows to the burner-pipe P through the port of the high-pressure chamber J and pipe M, and also through the ports of the low-pressure chamber J^1.

As soon as the lamps are lighted, the pressure in the mains is again lowered to its normal pressure, whereby the diaphragm drops and the valve cuts off the supply of gas. The main pipe H is provided with a pilot burner.

Gas-Light Apparatus.

HARDT, J. W., of Hamburg.

No. 6322; March 15, 1907.

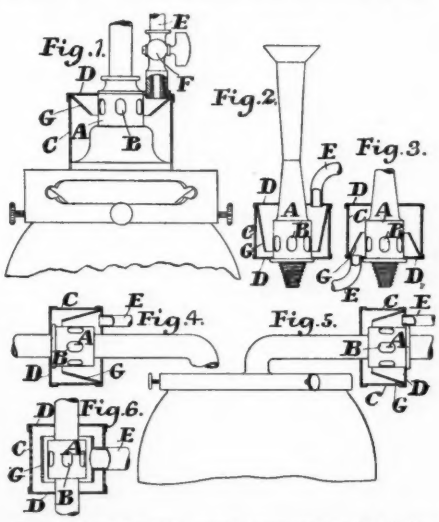
This is an "invention" for "giving a diffused light in which the light rays of one or of a number of incandescent gas-burners are thrown by a reflector against the roof or against a wall surface in the room to be illuminated, and are distributed throughout the room by the roof or wall. The proposal merely consists in mounting the suction-chamber with the air-inlet opening of each burner-tube outside of the reflector. The patentee claims that, by this arrangement "the effect is obtained that the atmospheric air, with its entire contents of oxygen, passes without hindrance into each burner-tube; whereas an unfavourable influence is exerted on the oxygen if the air-inlets of the burner-tubes are in the space heated by the sources of light above the screen. In that case, the flow of air is hindered while it is powerfully sucked beneath the apex of the cone. By the new arrangement, however, a very satisfactory illuminating power of the burners is obtained, which, in turn, ensures good illumination of the room."

Incandescent Gas-Burners.

THORP, T., of Whitefield, Lancs.

No. 14,317; June 21, 1907.

When incandescent gas-burners are used in places where the air is contaminated with any matter that tends to choke the burner-orifices—such as those used in textile mills—it has hitherto been customary to surround the inlet-ports with wire gauze, to filter the air before being mixed with the gas; but this method alone is insufficient, as the gauze itself gets choked up in a comparatively short time, even when used in the form of casing round the bunsen tube and of large dimensions.



Thorp's Incandescent Burner Arrangement for Mills.

The object of the present invention is to remedy this defect. by surrounding the air-ports of the bunsen tube with a gauze casing made with a fine mesh—the casing being preferably cylindrical and having solid ends. An inlet opening for the supply of air under pressure and preferably a tap or adjustable valve are provided at one end of the casing—the tap or valve being connected with an air supply under pressure. Thus the air entering the casing can be regulated so that there is a slight excess over what is necessary for the requirement of

the burner, and which excess will escape through the gauze casing so as to keep the gauze normally free or clean.

A is the mixing-tube with air-inlets B, surrounded by the casing C made of wire gauze with, preferably, solid ends D. To one of these ends the pipe E for supplying air under pressure is connected, and fitted with a regulating tap F, as in fig. 1. Preferably the air-inlets of the mixing-tube are surrounded by a conical or cylindrical shield G, into the inside of which the air is conducted, to prevent it from spreading at once and to assure a sufficient supply of air under pressure to the mixing-tube.

Fig. 1 shows the application of the invention to an inverted incandescent burner with gas supply from above; fig. 2, its application to an upright burner, with the air-supply pipe entering at the top of the gauze casing; while in fig. 3 the air-pipe is connected to the bottom of the casing. Figs. 4 and 5 show its application to an inverted burner with a horizontal mixing-tube, with the air-inlet at the front and back of the casing respectively. Fig. 6 shows a modification of the arrangement of the air-supply pipe, which enters through the side of the wire gauze and passes to the inside of the cylindrical shield G.

Incandescent Gas-Mantles.

SUSSMANN, H., of Berlin.

No. 16,867; July 23, 1907.

The patentee claims as his invention: "In the manufacture of incandescent mantles for gas lighting, precipitating the salt or salts with which the fibrous material is impregnated by means of an organic base or a mixture of organic bases."

In his specification, he remarks: Mantles for incandescent gas lighting are usually manufactured by impregnating a fabric consisting of vegetable or artificial fibre with a solution of a salt of a suitable "rare earth" that will be highly luminous when incandescent. For impregnation, the nitrates of such earths are almost exclusively employed. Even at ordinary temperatures, such salts are apt to give off nitric acid; and, consequently, when the mantle is stored for any length of time without being incinerated, or "burnt off," the acid is apt to attack the fibre and even to destroy it. Moreover, when the mantle is being burnt off, the evolution of nitric acid takes place so rapidly that the whole mantle is apt to fall to pieces, particularly when made of artificial fibre, which is more delicate than natural vegetable fibre. To obviate this disadvantage, the mantles, after impregnation and drying, have heretofore been passed through an alkaline bath or solution. In that case the earth or earths are precipitated upon the fibrous organic material as hydroxides; while the nitric acid combining with the alkali is removed with the latter by washing. Organic bases have also been used in the impregnating solution—forming therein metathorium, zirconium, or the like hydrate, according to the composition of the solution. When alkalies are so used, they will precipitate not only the earths that are desirable, but also impurities which the latter are apt to contain, and which thus are retained in the mantle. Such impurities injuriously affect the luminosity and durability of the product, and cause inconveniences in the manufacture. Thus in the manufacture of certain mantles from thorium and cerium, even though they have been treated with ammonium, they are apt, when being burnt off and shaped, to shrink very materially.

The object of the present invention is to obviate these difficulties; and the essential feature is that the precipitation of the earth or earths upon the fibre is effected by an organic base, or organic bases, and not (as heretofore) by alkalies.

It has also been found that in manufacturing a mantle by precipitation it is essential so to proceed as to give the precipitate such constitution as will make it as far as possible tough and viscous or colloidal; and, consequently, precipitants that will cause the production of an amorphous pulverulent precipitate are not suitable. The mantles will be improved in their physical properties in proportion as the precipitate is more colloidal.

According to this invention, therefore, an organic base is used as the precipitant. A great number of such bases will be found suitable. The use of such bases for the purpose presents the additional advantage that suitable selection of one enables the precipitation of certain only of the earths with which the fibre is impregnated, while others remain in solution and can be eliminated by washing. This selective action of the bases permits the removal even of minute quantities of undesirable constituents present in the impregnating solution; and this is assisted by the large surface presented by the fabric.

As stated, a large number of organic bases may be employed—such as aniline, *o*-toluidine, xylidine, and pyridine. Many others may be used, or mixtures of two or more such bases; and in order to obtain perfect precipitation, it is preferable to use hot solutions.

In carrying the invention into practice, the mantle, the mantle fabric, or the fibre or yarn from which it is to be manufactured, is impregnated in the usual manner. Either when still wet or after drying, the material, preferably in the form of a completed mantle, is placed into the organic base, or mixture of bases (if a liquid, or in solution), and left there for some time, after which it is taken out, wrung if required, washed, and dried. In many cases little or no washing will be needed as, generally speaking, the organic bases have no destructive effect upon the fibre.

As a solvent or diluent for the bases, alcohol, water, or other suitable liquid may be used. When water is employed—say, in an aqueous solution of pyridine—care will have to be taken to make a solution of such strength as to cause complete precipitation and to prevent re-dissolution. An aqueous solution of pyridine should contain (say) not less than 20 per cent. of pyridine.

Instead of using the organic bases in liquid form, vapours of such bases may be employed, either upon the wet or the dry material previously impregnated. The last-mentioned manipulation will, it is said, in some cases be desirable on the score of economy, as less of the precipitant need be used than when the mantle has to be saturated with liquid.

In practising the process, the material may simultaneously be impregnated with all the salts it is to contain, or precipitation may follow impregnation with each salt separately. Thus in making a mantle with thorium and cerium, the mantle may be impregnated with a thorium salt only, which is precipitated by an organic base which will only affect thorium, and then impregnated with cerium, which, in turn, is precipitated by itself.

Mixing, Measuring, and Carburetting Gaseous Bodies.

BOUVIER, A., and COLLON, E., of Paris.

No. 20,199; Sept. 10, 1907.

This invention is an "improvement" in the apparatus described in patent No. 21,022 of 1906.

As the gaseous mixture there produced may be subject to small periodical variations of pressure corresponding to the strokes of the pumps, without giving rise to inconvenience in the consumption of the mixture—since the consumption of the burners only varies as the square root of these differences of pressure—and as these small variations are of so great a frequency as to have no influence on the combustion, the reservoirs of fixed size, or the receiver of variable volume, described in the earlier patent, may be omitted without inconvenience by mixing the gas and air directly after issuing from the pumps. The volumes are delivered in the desired proportion, which is that of the pump cylinders; but the proportion can be regulated by varying the size of the air-pump cylinder, as explained in the specification.

The regulation of the delivery is also effected by a single diaphragm regulator operated by the pressure in the delivery pipe and acting on the two pumps, the delivery from which it stops simultaneously (by keeping their inlet valves open) as soon as the pressure in the delivery pipe gets beyond a certain value. Under these conditions, it is necessary that the delivery from the two pumps should be always in a fixed ratio—a result obtained by driving both pumps from a single crank-shaft. The variations in the delivery of the apparatus are compensated sufficiently well by means of elastic bags which form a reservoir, whose size may be increased if more perfect regulation is desired, but which will be free from danger by reason of its comparatively small size and the small damage which would be caused by an explosion.

Moreover, in order to admit of being able to produce by the combustion of the mixture a flame which may be sometimes oxidizing and sometimes reducing without altering the apparatus, it is merely necessary to arrange the apparatus so as to have a reducing flame and to pass the mixture into a burner having a secondary air supply, which can be regulated so as to modify the quality of the flame.

Ball-and-Socket Joints for Gas-Pendants.

FURCH, A., of Berlin.

No. 23,629; Oct. 25, 1907. Date claimed under International Convention, July 25, 1907.

The patentee proposes a ball-and-socket joint for gas-pipes, one member of which is provided with recesses, a groove, or the like into which portions of the other member are forced or pressed so as to prevent any unscrewing, wrenching, or overscrewing of the connected parts.

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1392.—ADAMS, M. J., "Acetylene apparatus." Jan. 21.
1406.—CARTER, S., "Back-pressure seal, and overflow, for washer in carburetted water-gas plants." Jan. 21.
1453.—DOWN, H. L., and TELEPHOS, LTD., "Gas-burners and electrical devices for controlling, igniting, and extinguishing gas from a distance." Jan. 21.
1486.—WIGLEY, P., ARCULUS, G. N., and WARRY, J., "Regulating bunsen burners." Jan. 22.
1493.—KELVEY, H. E., "Distance gas-lighters." Jan. 22.
1504.—COELHO, A. D., "Producing gas from oily seeds." A communication from A. T. Pinto. Jan. 22.
1506.—CROSSLEY, W. J., and ATKINSON, J., "Internal combustion engines." Jan. 22.
1553.—COALES, H. G., "Artificial fuel." Jan. 22.
1558.—RIDER, J. J., "Rotary pumps, blowers, &c." Jan. 23.
1564.—SHAW, J. A., "Combined coal and gas range." Jan. 23.
1608.—PERCY, T. M'L., and BYROM, T. H., "Extracting hydrocyanic acid from waste gases." Jan. 23.
1619.—WILSON, L. B., "Economizer rings for gas-stoves." Jan. 23.
1620.—BERRENBERG, R., "Rotary pumps." Jan. 23.
1643.—BROAD, C. C., "Production of gas." Jan. 23.
1673.—RIES, H., "Retorts." Jan. 24.
1695.—NICKEL AND MÉTHANE SOCIÉTÉ ANONYME, "Producing gas for lighting, heating, and motive power, and simultaneously producing nitrogenous compounds." Jan. 24.
1757.—CLOUDSLEY, J. L., JUN., "Automatically lighting and extinguishing gas-lamps." Jan. 25.
1764.—TALBOT, B., "Gas-producers." Jan. 25.

Water Charges at Liverpool.—Alderman Burgess, the Chairman of the Liverpool Water Committee, stated at a recent meeting that, notwithstanding the fact that the Committee were now paying full charges for sinking fund and interest in respect of the second pipe-line from Vyrnwy and the purchase of the Rivington watershed, there was not likely to be any increase in the domestic water-rent for next year. Such a result, he remarked, could only have been brought about by the economical way in which the Water Engineer (Mr. J. Parry) had saved everything that was possible, while not in any way sacrificing the efficiency of the department.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Coal Miners' Eight Hours Bill.

SIR,—Last month, a deputation of coalowners was received by the Home Secretary, who expressed surprise that the users of coal had not moved in this matter; and his remarks gave the impression that any representations on their part would not be unwelcome.

I am glad to say that the railway companies, the steel makers, and other large users of coal have taken alarm at the expected increased cost of getting coal should the Bill be passed; and the gas industry is also moving, through the Gas Companies' Protection Association—a special meeting having been called for Thursday next.

As the notices are only sent to the members, I think it well to invite the co-operation of all gas companies in the effort to prevent a large permanent increase in the cost of coal which all the authorities believe will be the result of the Eight-Hours Bill if it should become an Act of Parliament. And not only the gas companies, but the corporations supplying gas may well take action in this matter, either by joining with the companies or (much better) acting independently. They could also champion the private consumers of coal, who—and especially the poor—will probably suffer most from a permanent increase of price. Why should not the Chambers of Commerce take up the matter on behalf of the innumerable traders who cannot take united action?

There is no time to be lost. It is expected that the meeting on Thursday will decide on a memorial to the Home Secretary, and ask him to receive a deputation; and other trades and interests will do likewise. Let not the gas industry be backward in the work. Any communication on the subject may be sent to the Secretary of the Gas Companies' Protection Association, No. 5, Victoria Street, S.W.

South Metropolitan Gas Company, GEORGE LIVESEY.
709, Old Kent Road, Feb. 1, 1908.

Since the above letter came to hand, we have received the following from Sir George Livesey.—ED. J.G.L.

THE COAL MINES (EIGHT HOURS) BILL, 1907.

The object of this Bill, which was introduced by the Government last year, is to limit the number of hours which a coal miner may spend below ground to eight. This period includes not only his working hours, but the time occupied by him in passing between his work and the surface, and at meals. The average time spent in this way by a coal miner is given by the Report of the Departmental Committee, which was appointed by this Government in 1906 to inquire into the subject, as one hour and 39 minutes, so, if the Bill becomes law, the working day of a coal miner will be less than six hours and a half.

The present working day is about seven hours and a half. The passing of the Bill will, therefore, reduce the time available for getting coal by one hour, or, after making allowance for the various customary short days and holidays, considerably over 10 per cent.

Such a considerable decrease in working hours must mean a proportionate reduction in output, which would inevitably result in a more than proportionate increase of price. The representatives of the coal-owners, in their evidence before the Departmental Committee and in their recent deputation to the Home Secretary, estimated the reduction of output at 25¾ million tons at the lowest; and the Committee, while declining to accept this figure and referring to certain mitigating considerations, such as the possibility of greater industry on the part of the men and greater employment of machinery by the masters, summed up their conclusions on page 36 of the report, as follows: "After giving all reasonable credit to these considerations, we are, nevertheless, convinced that the establishment of a fixed eight-hour day, whether introduced suddenly or gradually by annual reductions of half-an-hour, cannot but result in a temporary contraction of output and a consequent period of embarrassment and loss to the country at large."

These words prove beyond a doubt that if the Eight Hours' Bill promised by the Government this session is on the same lines as their Bill of 1907 and becomes law, all the great industries in the country which depend for their existence and prosperity on cheap coal—the iron and steel industry, the railway industry, the shipping industry, the gas industry, and others too numerous to mention—will suffer, and every member of the public will have to pay more for his coal. A temporary contraction of output means a shortage of coal, which always puts up the price; and past experience shows that part of the increase is permanent, for prices do not return to the old level.

It must also be remembered that, in addition to the reduction of output, the limitation of eight hours from bank to bank must necessarily increase the cost of getting coal; so there will be two agencies at work, each adding to the price.

There is a great mass of the nation on one side, and the coal miners, a comparatively small minority, on the other. Their wages are high, employment is plentiful, their working hours, having regard to the large number of short days and holidays, only average 43 hours 13 minutes per week, but a large percentage of miners absent themselves from work on other days than holidays. The Committee also expressly find (see page 60 of the report) that their health will not be affected by the change. They are not even united, because Mr. John Wilson, M.P., representing the Durham miners, in his evidence before the Departmental Committee (Question 14,259) asserted that, from a purely working man's point of view, a legal eight-hour day would be one of the greatest evils that ever came into the county of Durham.

There is no body of men less needing protection by legislation than the coal miners. Their strong labour organization makes them master of the situation, independently of Parliament.

Under these circumstances, it may fairly be said that there is no case for the Bill, and that the public interest demands its rejection.

But the political influence of the miners with the Government is so strong that the Bill will certainly pass, unless the most determined and effective opposition is shown by all coal users.

The first step will be to memorialize the Home Secretary without loss of time, and to ask him to receive a deputation. The railway companies, the steel makers, the gas companies, and others have already moved; and it is their intention to act each for their own industry. It is felt to be impracticable for all trades to unite in one memorial and one deputation, as thereby the various interests could not be properly represented.

The Home Secretary, in his answer to the deputation of coal owners on the 8th of January, 1908, expressed surprise that no representations on the part of coal consumers had yet been made to him.

The "Buisson Hella" System of Lighting and Heating.

SIR,—I notice in your last issue a statement to the effect that a Company has been formed for the purpose of acquiring, *inter alia*, certain inventions relating to the manufacture of mantles for lighting and heating by a new system known as "Buisson Hella," together with all patents granted and to be granted therefor in England and elsewhere (except France). The inventors of the above process (which is known in France as "Buisson Hella") are Messrs. Michaud and Delasson; and they authorize me to state, on their behalf, that they are the proprietors of the patents or patent rights for the said invention for England and elsewhere (except France), and that they have not sold, or entered into any agreement for the sale of, any of the said patents or patent rights, nor have they granted any option for purchase to anyone.

Jan. 30, 1908. J. W. SEARLE.

PARLIAMENTARY INTELLIGENCE.

OPENING OF THE SESSION.

The King's Speech.

The third session of the Second Parliament of the present King was opened last Wendesday by His Majesty (who was accompanied by the Queen), with the usual formalities. The speech from the Throne contained references to three matters in which our readers are interested—viz., the regulation of the hours of underground labour in coal mines, the amendment of the system of valuing property in England and Wales for the assessment of Imperial and local charges, and the establishment of an authority for the control and improvement of the port and waterway of London. Later in the day, the Home Secretary (Mr. Gladstone) and the President of the Board of Trade (Mr. Lloyd-George) gave notice that on an early day they would introduce a Coal Mines Regulation Bill and a Port of London Bill.

Allocation of Private Bills.

At the meeting of the House of Commons on Thursday, the Chairman of Ways and Means (Mr. A. Emmott) reported that, in accordance with the Standing Orders, he had conferred with the Chairman of Committees of the House of Lords (the Earl of Onslow) to determine in which House the respective Private Bills should be first considered; and they had decided that the following should originate in the Upper House:—

Ammanford Urban District Council Water Bill, Audenshaw and Saddleworth Urban District Councils Bill, Bognor Gaslight and Coke Company Bill, Briton Ferry Urban District Council Bill, Huddersfield Water Bill, Keighley Corporation Bill, Llanelly Gas Bill, Llanelly and Burry Port Water Board Bill, Merthyr Tydfil Corporation Bill, Monmouthshire County Council Bill, Pontypridd Water Bill, Ravensthorpe Urban District Council Bill, Rhymney and Aber Valleys Gas and Water Bill, Skegness Urban District Council Bill, Swansea Valley Gas Bill, Wath-upon-Dearne Urban District Council Gas Bill.

The following Bills will therefore originate in the Commons:—

Blackburn Corporation Bill, Blaydon and Ryton Water (Transfer) Bill, Bromley and Crays Gas Bill, Burnley Corporation Bill, Bury and District Joint Water Board Bill, Conway and Colwyn Bay Joint Water Board Bill, Criccieth Water and Improvement Bill, Dartford Gas Bill, Derby Gas Bill, Draycott Gas Bill, Dublin and Central Ireland Electric Power Bill, Garw and Ogmore Gas Bill, Glyncorrwg Urban District Council Bill, Gosport Gas Bill, Greystones Gas Bill, Holderness Water Bill, Leicester Corporation Bill, Lincoln Corporation Bill, Liverpool Corporation Bill, Manchester Corporation Bill, Margate Corporation Bill, Padiham Urban District Council Bill, Rochdale Corporation Bill, Slough Urban District Water Bill, South Lincolnshire Water Bill, South-West Suburban Water Bill, Southwell District Gas Bill, Stockport Corporation Bill, Swinton and Mexborough Gas Bill, Tenderton Corporation Gas Bill, West Bridgford Urban District Council Water Bill, Wolverhampton Corporation Bill.

The Tynemouth Town Council have applied to the Local Government Board for sanction to borrow, among other sums, £4000 for street lighting purposes. At the inquiry, it was explained that the scheme for improving the street lighting included the substitution of incandescent gas-lights and new lanterns in place of the old flat-flame burners wherever these existed; the erection of additional lamps where needed; and provision for new streets likely to be opened out during the next two or three years.

LEGAL INTELLIGENCE.

SOUTH METROPOLITAN GAS COMPANY AND THEIR ASSESSMENT APPEAL.

The Alleged Disqualification of a Justice of the Peace.

In the Court of Appeal last week, Lords Justices Vaughan Williams, Farwell, and Kennedy had before them an appeal by the South Metropolitan Gas Company from the judgment of Justices Bray and A. T. Lawrence, sitting as a Divisional Court, discharging a rule for *certiorari* calling upon the Justices of the County of London to show cause why the orders made by them in certain appeals should not be brought up to be quashed on account of interest and bias. The appeals were heard by three Justices—viz., Mr. R. Wallace, K.C. (Chairman), Admiral Hand, and Mr. Willoughby—and they were eventually dismissed. Mr. Willoughby was at one time an official Justice of the Peace, being a Holborn Borough Councillor, and in this capacity had dealt with appeals by the Gaslight and Coke Company; and consequently, it was urged, he might reasonably be suspected of bias, as it was to the interest of one part of London to see that the rate in another part was kept up. Though no personal accusation was made against Mr. Willoughby, it was said that, as Chairman of the Holborn Assessment Committee, he might have an unconscious bias in the direction of the interests of his constituency, and that gas companies could not expect to get fair and impartial justice from a Committee appointed by a class whose decision might be against the companies and in favour of the class appointing the Committee. The assessment appeals were heard early last year, and reported in the "JOURNAL" at the time. The rule was granted by Justices Darling and Lawrence on the 7th of June, and discharged on the 26th of July by the last-named learned Judge sitting with Justice Bray. The later proceedings were reported in the "JOURNAL" for July 30, p. 333.

Mr. DANCKWERTS, K.C., and Mr. WALTER C. RYDE appeared for the appellants, and made it perfectly clear that it was no part of their case to suggest personal misconduct on the part of Mr. Willoughby. Their strong point was that he belonged to a class, and so was open to suspicion. The learned Counsel argued this point at length; quoting statutes and decided cases in support of their contentions.

Mr. HORACE AVORY, K.C., and Mr. TYRRELL PAINE appeared for the Justices, and the four Assessment Committees concerned were represented by Counsel. They were, however, not called upon.

THE JUDGMENT.

Lord Justice VAUGHAN WILLIAMS: I think this case is of very considerable importance. As to the main principles which should govern our decision, there is really no difference between the principles which have been adopted by Mr. Justice Bray and Mr. Justice Lawrence in giving their judgment and the principles which have been urged upon us by Mr. Danckwerts and Mr. Ryde. No one suggests that in these bias cases you have to prove bias in fact. No one suggests at all that the finding that there was a sufficient bias to disqualify involves any consideration of the personal qualities or the personal actions of the Magistrate said to be disqualified. Everybody agrees that the whole basis of these decisions with reference alike to pecuniary interests and to bias is a question as to the effect likely to be produced upon the minds of the public, or upon the minds of a class of the public, as to the fairness of the administration of justice if a Justice under the circumstances proved in the particular case is allowed to sit and take part in the decision. These being the principles, it is plain that very often there will arise a question of fact which is difficult to decide because that question of fact is really a question of degree, which has to be decided in every case. We cannot take another case and say on the facts of that case, which was very like this, that it was held that there was sufficient likelihood of bias to disqualify the Justice in that case; or that in another case it was held that in the circumstances of that other case there was not sufficient likelihood of the Justice of that class being affected in his judgment to hold him disqualified. You have to decide this question of degree in every case. Having said this, I am going to apply my mind to the question of degree in this particular case; and I will just call to memory the fact that it was upon this very question of degree that Lord Justice Cotton and Lord Justice Bowen differed from the decision of Lord Justice Fry. One really cannot help seeing in the history of these decided cases, if you take them chronologically, that a different spirit has prevailed in dealing with this question of sufficiency—this question of degree—at different times in legal history. Let me take an example. If you take the time when Lord Chief Justice Cockburn presided in the Queen's Bench, I cannot help thinking that he would have found that there was a sufficiently reasonable suspicion of bias arising on facts upon which at a later period in legal history the probabilities were the Judges of that day would not find that there was a sufficient degree of suspicion of bias arising upon the state of facts. We have, therefore, as I say, a very difficult question to decide, and a question as to which really authority does not help us much, because all that the authorities have done here is to give the sanction of the reported cases that have been read to us to principles which are not in any way in dispute. I will take first Mr. Justice Bray's judgment. He takes the objections one by one; and I agree with the way in which he deals with each one of these cases down to a point which I will mention in a moment. He deals first with the ratepayers' question. The question of bias being inferred from a man being a ratepayer was given up expressly by Mr. Danckwerts when in the King's Bench Division. He did not rely upon it; and therefore I need not trouble about that. Then Mr. Justice Bray said: "Therefore it must be some other interest than a pecuniary interest on which it is said that he is disqualified from acting. Now let us see Mr. Willoughby's position. It is this: He was a member of the Holborn Borough Council, and was deputed or chosen by the Borough Council as a member of the Assessment Committee, and became Chairman of the Assessment Committee. Now I will take the test which is laid down in 'Allinson' as the test that we ought to apply to-day. It goes very far, very far indeed. I am not quite certain that I would go the whole length; but for the purposes of this case, I must so take it. What Lord Esher says"—and then he quotes a passage from Lord Esher's judgment, and then went on to say: "The question I propose to consider now is whether Mr. Willoughby could be reasonably suspected of being biassed." I do not think that expresses it very happily, because, as I say, it is not a personal question as regards this particular person at all; but I daresay that is exactly what Mr. Justice Bray meant: "Now on what ground? It is said that on the ground that he was a member of the Borough Council." All I can say is that, in my opinion, this is a wholly insufficient ground. "Then I asked the question why he should be suspected of being biassed because he was a member of the Borough Council; and the answer of Mr. Danckwerts, as I understand him, was this: Every Borough Council has an interest in the rating of every other parish being as high as it possibly can be, because their rates will be to a certain extent diminished thereby. Therefore, it is said a member of the Council must be suspected of being biassed because it is his duty to see that his parish is treated perfectly fairly. Now it seems to me that is absolutely too remote." I entirely agree with every word that Mr. Justice Bray states there. Then he deals with the answers that were given by Mr. Ryde, and goes on, in the only part of the judgment as to which I shall say anything criticizing it: "There was undoubtedly another ground, and a different ground as it seems to me, put forward in the affidavits; but that has not been pressed by Mr. Danckwerts, and very properly so. That was this: That because it would be his duty to consider objections by another Gas Company (the Gaslight and Coke Company), he would have to decide questions of that kind, and therefore might not be fit to decide such a question as this. Now that seems to me entirely disposed of by the 'Suffolk' case. It may be the 'Suffolk' case does not entirely cover the whole ground here. But it certainly covers that; and it seems to me this application fails, and the rule must be discharged." Now I have every respect for Mr. Justice Bray, and have always had for every word that he utters as a Judge; but I am not quite satisfied regarding the way he has disposed of the last point. As I understand Mr. Ryde's argument to-day, his whole argument was based on this last point. Although one recognizes it in the description given by Mr. Justice Bray, I do not think it was put quite as Mr. Ryde has put it before us to-day. His suggestion is that this gentleman, as Chairman of the Assessment Committee, has had to deal, and will have in future to deal, with points very like the point which came up for decision before Quarter Sessions on this appeal. He says that, under these circumstances, it is not convenient that a person who in another capacity—that is, as Chairman of the Assessment Committee—whose valuation is really the basis of the rating, if he is in the habit of dealing with the questions that are now raised on this appeal, that might reasonably raise a suspicion that when this question comes to be raised before Quarter Sessions he will be likely to deal with it from the very same point of view that he dealt with similar questions when they came before him as Chairman of the Assessment Committee making the valuation. The affidavits that have come before us do not show that the same questions have ever been dealt with by Mr. Willoughby as Chairman of the Assessment Committee. They do not even show that the same questions in kind as those raised on the appeal at Quarter Sessions have been dealt with by Mr. Willoughby at any time. Really, what is said here is that Mr. Willoughby, in his capacity as Chairman of the Assessment Committee, has very often had to deal with objections to valuations made on behalf of the Gas Company; and it is said that, in the opinion of Sir George Livesey and others connected with gas companies, these points, which so often arise on the objections of the Gas Company to a valuation made before the Assessment Committee (Mr. Willoughby presiding over it), had been very harshly and hardly dealt with. Therefore it is not unreasonable to suppose that Mr. Willoughby, when he acts as a Justice at Quarter Sessions hearing this appeal, will be actuated by the same sort of hard feeling against the Company in the case of objections by Gas Companies. I think that is too remote; but I am very anxious to make it clear that I am only deciding that, in this case, the degree of suspicion is not sufficient to make it right that the Court should hold that Mr. Willoughby, as Chairman of the Assessment Committee, is disqualified from being on the bench on an appeal of this sort. I am very far from saying that it could not be that in some other case affidavits might show that the Chairman of the Assessment Committee had dealt possibly with identical questions to those raised on this appeal to Quarter Sessions, and had expressed strong opinions as to how the question ought to be decided by an Assessment Committee. I can conceive a case where the facts might be such that it would be most improper for the Chairman of the Assessment Committee, having regard to these matters that had come before him and the decisions he had arrived at with respect to particular questions, if those identical questions were raised on an appeal to Quarter Sessions, to sit as a member of that Court of Appeal. Of course, if one once arrives at the conclusion that it would be right to exclude if the questions thus dealt with were absolutely identical, it is a mere question of degree if they were shown by the affidavits to be nearly identical. I am quite well aware that if a position is true, which I think Mr. Justice Lawrence mentions, a Chairman of Quarter Sessions might find it very useful to have the assistance as a brother Magistrate of a Chairman of an Assessment Committee, because he would be a man having wide experience in the valuation of the property of large commercial companies like a gas company. I feel that he might find it very useful to have that experience. There is no objection to a Magistrate simply because he has had large experience in rating cases of the very type that were coming before the Quarter Sessions. Although that is so, it may very well be that the particular experience of this Chairman of the Assessment Committee has caused him to deal with, and express opinions upon, the identical question raised on the appeal to Quarter Sessions; and if you had that, I can quite conceive a case in which the degree of suspicion might be so large that you would no longer say it was too remote, but you would say that it was sufficient to justify a finding of such a suspicion of bias that it would not be desirable, in the administration of justice, that that particular Magistrate should sit. But, of course, as I have already said, it involves no personal assumption that the particular Magistrate would, in these circumstances, give

any effect to the bias. It is only that the Magistrate must not sit under circumstances which would raise reasonable suspicion in the minds of the public or a class of the public. Then, of course, that being so, and it being a question of degree, when you find a question on appeal raised in different parts of the country where the circumstances are all different, in such a case probably the Court would not find it easy to come to the conclusion that there was any such bias as ought to exclude the particular magistrate. But, as I have said, although I come to the conclusion that this appeal ought to be dismissed, and although I agree in the main with every word that has been expressed by Mr. Justice Bray and Mr. Justice Lawrence, I am anxious that it should not be supposed that the dealings of the Chairman of the Assessment Committee with particular questions as such Chairman might not raise a suspicion, and accordingly disqualify him in a case where the Assessment Committee had to deal with the identical question, and might very often, or might always, have to decide in the same way. In my opinion, this appeal should be dismissed with costs.

Lords Justices FARWELL and KENNEDY concurred.

Liability for Typhoid Fever Outbreak at Malvern.

After a hearing extending over eleven days, Mr. Justice Lawrance and a Special Jury brought to a conclusion last Tuesday an action in which Dr. Fergusson, the proprietor of a well-known hydropathic establishment at Malvern, claimed damages from the Urban District Council for losses incurred by him by reason of the drinking water at the house having been polluted by sewage, which he alleged had negligently escaped from the sewers under the defendants' control. The latter denied negligence, and said that if sewage did escape, this was not the cause of the outbreak, but rather the bad sanitary arrangements at the establishment. They further said that in law the plaintiff had no cause of action, as he had no proprietary right in the water which was said to have been polluted by sewage, nor had he obtained any licence to take it. Mr. M'Call, K.C., Mr. Macmorran, K.C., and Mr. Southall appeared for the plaintiff; Mr. Montague Lush, K.C., Mr. Montague Shearman, K.C., and Mr. M'Cardie represented the defendants. At the conclusion of the evidence and Counsel's address to he Jury on behalf of the defendants, his Lordship, in summing up, said the plaintiff alleged that up to 1905 he had a supply of pure water, and then it was polluted by sewage. How he obtained the supply they could not tell. If by licence, it had not been revoked, and he had a right to continue getting the supply. Having referred to plans exhibited during the hearing, his Lordship said they were the most important piece of evidence in the case. He left the following series of questions to the Jury: (1) Had the plaintiff any property in the water flowing from the Tudor well into his tanks? (2) Had he any licence from the owners to use the water? (3) Were the defendants guilty of negligence in permitting sewage to escape from their sewer? (4) If they were, was the plaintiff guilty of contributory negligence? (5) Was the escape of sewage from the sewer the cause of the outbreak and the illness, or was the outbreak due to the state of the drainage of the house or to both causes? (6) Could the outbreak of illness have been prevented if the plaintiff had acted with reasonable care? (7) What were the damages, if any? The Jury answered the questions as follows: (1) "No;" (2) "No;" (3) "Yes;" (4) "No;" (5) The escape of sewage was the only cause; (6) "No;" (7) damages £7500. Mr. Lush said that, as the Jury had found the plaintiff had no title to the water, the defendants were entitled to judgment. It was an important question of law, which he was prepared to argue. Justice Lawrance said the matter was in train for the Court of Appeal, where the case could go. He entered judgment for the plaintiff, and granted a stay of execution.

Pseudo Gas Collector Sent to Prison.

A man named Albert Lakin was charged at the Newton Abbot Police Court yesterday week with attempting to obtain the sum of £2 by false pretences. It was stated that the prisoner, who was a stranger in the town, went to the house of a Mrs. Pinsett and asked for the gas account. A policeman who had been watching the man and overheard the conversation, took him into custody. Prisoner, who said he had been for ten years in the Gloucestershire Militia, denied that he had attempted to obtain the money, and made an ingenious defence. When he called at Mrs. Pinsett's house, he said, she asked him if he was Mr. Clark, the Gas Manager, and complained that something was the matter with the meter. As he wanted to do her a good turn, when she opened the cellar door he went down. When he came up again, the policeman took him into custody. He asked the Magistrates to believe that it was very unlikely that, being a stranger to the town, he should have gone about trying to collect gas accounts, and said it was untrue to say that he had stated he was Mr. Clark's representative. The Magistrates, however, were convinced that it was an ingenious attempt at robbery, and sent prisoner to gaol for a month, with hard labour.

An Unauthorized "Tester" of Gas-Meters.

At the Maidenhead Borough Police Court, on the 23rd ult., George Cadle, a labourer, was charged with feloniously stealing 7s. 3d., the property of the Maidenhead Gas Company, from a prepayment meter at a house in Clare Road in the occupation of Mrs. Gray. This lady stated that the accused called on the 16th ult., and said he had come to test the gas-meter, as he and his mate were doing this all along the road. Thinking he was in the service of the Gas Company, he was admitted. He disconnected the meter, took it outside, subsequently replaced it, and then left the premises. As witness's suspicions were aroused, she communicated with the Company. Mr. E. J. Wolfe, the Assistant-Manager of the gas-works, said he had examined the meter at Mrs. Gray's house, and found the padlock broken and the money-box missing. On this evidence, he was remanded. He was brought up again on Monday last week, when it was stated that the police had evidence of a further offence in connection with a gas-meter from which 6s. 1cd. had been taken. Prisoner pleaded guilty to both charges, and was sentenced to a month's imprisonment with hard labour.

MISCELLANEOUS NEWS.

GASLIGHT AND COKE COMPANY'S ACCOUNTS.

[For the Half-Yearly Report, see p. 281.]

The accounts of the Company for the six months ending Dec. 31, to be submitted with the Directors' report on Friday, consist of the usual statements, from which we take the following particulars.

The statement of capital (stock) sets forth that the total paid up is £9,466,500; added on conversion, £12,176,565—total amount authorized, £21,643,065. Deducting the amount redeemed, £60,610, the total amount of the Company's existing capital powers is £21,582,455. The statement of loan capital stands thus: Total paid up, £2,844,000; added on conversion, £1,479,975; unissued, £750,000—total amount authorized, £5,073,975.

The capital account shows receipts (with premiums, £1,586,807 11s. 9d.) to the amount of £27,493,237 11s. 9d. The expenditure is shown in the following items:—

Expenditure to June 30, 1907			£13,459,499 1 1
Expenditure during the half year to Dec. 31, 1907—viz.,			
Buildings and machinery in extension of works	£18,003 15 7		
New and additional mains and service-pipes	16,965 13 3		
Do. do. meters	18,9 0 14 10		
Do. do. stoves	21,920 12 8		
	£75,800 16 4		
By depreciation of plant	£15,667 2 0		
By depreciation of meters and stoves	30,799 17 2		
	46,465 19 2		
		29,333 17 2	
Total expenditure			£13,488,832 18 3
Nominal amount added on conversion			13,656,540 0 0
			£27,145,372 18 3
Deduct amount of capital redeemed under Company's Act of 1903			60,610 0 0
			£27,084,762 18 3
Balance of capital account			408,474 13 6
			£27,493,237 11 9

The balance applicable to the redemption fund and to dividend on the ordinary stock is £693,568 0s. 4d.; and the following statement shows how it is proposed to appropriate it:—

Dec., 1906.			
£210,481	Net balance brought from last account		£306,952 6 10
363,940	Net revenue for the half year		386,575 13 6
£574,421			£693,568 0 4
10,000	Contribution to redemption fund		10,000 0 0
(£4 8s. per cent.)	Dividend on the ordinary stock—		
£334,468	£4 8s. per cent. per annum on £15,182,590		334,016 19 7
£229,953	Balance carried to next account		£349,551 0 9

The following is the revenue account:—

Expenditure.

Dec. Half Year, 1906.		£ s. d.	£ s. d.
	Manufacture of gas—		
£491,015	Coal into store	592,055 13 4	
77,627	Oil ,, less value of oil tar	80,752 11 5	
31,013	Coke and breeze used in the manufacture of carburetted water gas	37,147 9 4	
14,886	Salaries of Engineers and other officers	15,675 5 5	
104,984	Wages	97,702 19 0	
27,301	Purification, including £10,892 2s. 4d. for labour	19,028 7 10	
181,,84	Repair and maintenance of works and plant, materials and labour, less received for old materials, £5188 2s. 2d.	188,099 2 2	
			1,0,0,461 8 9
	Distribution of gas—		
42,091	Salaries and wages of officers (including rental clerks)	44,160 12 4	
69,999	Repair and maintenance of mains and service-pipes, &c.	49,644 18 6	
27,174	Repair and renewal of meters	48,262 14 0	
45,420	,, ,, stoves	50,788 7 2	
..	Gas fittings, including labour (automatic meter supplies)	31,910 9 10	
			224,767 1 10
19,401	Public lamps—lighting and repairing	..	19,715 13 9
	Rents, rates, and taxes—		
5,824	Rents payable	5,685 6 0	
136,743	Rates and taxes	138,914 1 4	
			144,799 7 4
	Management—		
2,750	Directors' allowance	2,750 0 0	
200	Company's Auditors and Assistant	202 2 0	
7,782	Salaries of General Manager, Secretary, Accountant, and clerks	8,962 19 5	
22,620	Collectors and cashiers	23,685 18 2	
5,312	Stationery and printing	6,327 11 8	
4,734	General charges	6,110 12 10	
			48,039 4 1
1,056	Law charges	..	1,191 16 10
5,223	Bad debts	..	6,377 15 3
500	Depreciation fund for works on leasehold lands	..	500 0 0
24,564	Annuities, including contribution to officers' superannuation fund	..	25,253 14 2
1,227	Workmen's compensation account	..	1,695 1 11
	Public officers—		
847	Gas Referees and Official Auditor	910 16 10	
1,000	Public testing-stations	599 19 7	
			1,510 16 5
£1,352,777			1,504,312 0 4
561,2.0	Balance carried to net revenue account		589,413 13 6
£1,913,987			2,093,725 13 10

Receipts.

Dec. Half Year, 1906.		£ s. d.	£ s. d.
	Sale of gas—		
£1,442,784	Per meter, at 2s. 11d. and 2s. 5d. per 1000 cubic feet	1,462,142 12 10	
69,492	Public lighting and under contracts	75,215 14 7	
			1,537,358 7 5
£1,512,276	Rental of meters (ordinary)	..	14,560 6 4
..	Rental of stoves	..	40,225 12 5
38,103	Rental of fittings	..	59,224 6 0
	Residual products—		
£218.187	Coke, less £33,798 3s. 5d. for labour, &c.	295,464 12 4	
12,094	Breeze, less £5007 4s. for ditto	17,054 13 1	
48,488	Tar and tar products	44,717 18 3	
80,027	Ammoniacal liquor and sulphate of ammonia	80,229 5 1	
			437,466 8 9
£358,796			
£4,537	Rents receivable		4,617 18 5
275	Transfer fees		272 14 6
£1,913,987			2,093,725 13 10

The three statements relating to the reserve, insurance, and depreciation funds show that the balances on Dec. 31 were as follows: Reserve fund, £64,106; insurance fund, £105,281; depreciation fund, £66,217.

The following statements relate to the working:—

Statement of Coals Used, &c.

Description of Coal.	In Store June 30, 1907.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store Dec. 31, 1907.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	129,735	928,403	827,868	4,886	225,384
Cannel	8,114	..	818	..	7,296
Total	137,849	928,403	*828,686	4,886	232,680

* In addition to this quantity of coal, 7,251,042 gallons of oil and 55,410 gallons of spirit were used during the half year.

Statement of Residual Products.

Description.	In Store June 30, 1907.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store Dec. 31, 1907.
Coke—tons	12,099	517,982	108,663	411,690	9,728
Breeze—tons	3,418	73,992	12,572	56,167	8,671
Tar, from coal only—galls.	629,680	8,546,002	8,268,635	15,140	891,907
Ammoniacal liquor—butts	14,264	235,057	221,426	..	27,895

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights and Under Contracts. (Estimated.)	Private Lights (per Meter).		
Thousands.	Thousands.	Thousands.	Thousands.	
*11,489,900	470,808	10,328,305	10,931,208	49,135
†11,288,134	472,670	10,211,254	10,803,847	49,596

* Including 2,460,878,000 cubic feet of carburetted water gas. † Dec. half year, 1906.

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, £173,634; oil and petroleum spirit, £42,971; coke, £7330; tar and ammoniacal liquor and products, £87,032; and sundries, £208,845. The figures this time last year were: Coal, £155,365; oil and petroleum spirit, £34,024; coke, £10,155; tar and ammoniacal liquor and products, £117,423; and sundries, £221,839.

SOUTH METROPOLITAN GAS COMPANY'S ACCOUNTS.

[For the Half-Yearly Report, see p. 281.]

The following are the principal portions of the accounts of this Company for the six months ending the 31st of December.

The first two statements relate, as usual, to the stock and loan capital. The former sets forth that the standard rate of 4 per cent. is payable on £6,011,224 and £418,671 (Act of 1901) of stock; while the latter shows that the loan capital, the rate of interest on which is 3 per cent., amounts to £1,798,994 and £96,451 (Act of 1901). The third statement is the capital account. It stands as follows: Amount received, £5,328,820; nominal amount added by conversion (less premium), £2,996,520—total, £8,325,340. The items of expenditure are as follows:—

Capital account to June 30, 1907		£5,012,497 9 2
Expenditure during half year to Dec. 31, 1907, viz.—		
New and additional mains and services	£8,661 4 3	
New and additional meters	7,506 17 1	
New and additional stoves	3,945 18 8	
		20,114 0 0
Total expenditure		£5,032,611 9 2
Balance		296,208 10 10
		£5,328,820 0 0
Nominal amount added by conversion, less premium		2,996,520 0 0
Total		£8,325,340 0 0

The following is the revenue account:—

Expenditure.

Manufacture of gas—		
Coal into store, including labour	£434,128 0 10	
Purification, including labour	9,529 16 9	
Salaries of Engineer and Officers at works	12,961 0 9	
Wages (carbonizing)	59,880 10 3	
Repairs and maintenance of works and plant, including labour, less £3460 14s. 6d. received for old materials	93,913 9 1	
		£610,412 17 8
Co-partnership		13,000 0 0
Distribution of gas—		
Repair, maintenance, and renewal of mains and service-pipes, including labour	£23,785 17 11	
Salaries and wages of officers, including rental clerks	17,987 11 11	
Repairing and renewals of meters, including 4143 slot meters damaged by robbery	26,973 16 0	
Repairing and renewals of stoves, including labour.	31,654 3 0	
Repairing and renewals of gas-fittings, including labour	6,197 0 6	
		106,598 9 4
Public lamps, including £18,069 15s. 6d. for labour and materials, less £15,765 5s. 7d. received for the same		2,304 9 11
Rents, rates, and taxes—		
Rents payable	£945 3 4	
Rates and taxes	41,773 7 11	
		42,718 11 3
Management—		
Directors' allowance	£2,408 7 3	
Salaries of Secretary, Accountant, and clerks	3,428 10 8	
Collectors { Ordinary	6,527 0 3	
Collectors { Slot meter	8,100 9 0	
Stationery and printing	3,059 8 3	
General charges	8,720 13 10	
Company's Auditors	112 10 0	
		32,356 19 3
Law charges	£10,449 17 4	
Parliamentary charges	70 1 3	
		10,519 18 7
Bad debts		2,262 0 0
Stolen from 4143 slot meters broken open		465 2 5
Pensions and officers and workmen's superannuation, sick, and accident funds		7,602 7 4
Gas Referees and Official Auditor		390 10 8
Total expenditure		£828,631 6 5
Balance carried to net revenue account		196,373 10 0
		£1,025,004 16 5

Receipts.

Sale of gas—		
Michaelmas, at 2s. 3d. per 1000 feet	£269,477 1 8	
Christmas, at 2s. 3d. per 1000 feet	384,914 7 0	
	£654,391 8 8	
Public lighting	15,935 7 3	
		£670,326 15 11
Meters in use (328,619)—		
Company's meters at rent: Ordinary, 100,456; slot, 219,665	£36,038 11 2	
Company's stoves at rent: Ordinary, 74,997; slot, 180,960; fires, 22,731	28,759 15 1	
		64,798 6 3
Residual products—		
Coke, less labour and cartage	£182,928 13 8	
Breeze, less labour and cartage	10,011 17 11	
Tar and tar products, less labour	32,484 17 7	
Sulphate of ammonia, less labour	62,616 10 4	
		288,041 19 6
Rents receivable		1,742 9 9
Transfer fees		95 5 0
Total receipts		£1,025,004 16 5
Total amount paid in wages for half year,	£270,957 1s. 11d.	
" " " salaries "	£34,576 5 0	

The net revenue account shows a sum of £162,999 13s. 4d. applicable to dividend on the ordinary stock. Following this are the statements relating to the reserve, renewal, and insurance funds. They show that the balances on Dec. 31 were as follows: Reserve fund, £183,700; renewal fund, £26,765; insurance fund, £108,484—a sum of £1406 being entered as "loss on coal by heating."

The statements furnishing manufacturing details are as follows:—

Statement of Coal.

In Store June 30, 1907.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store December 31, 1907.
Tons.	Tons.	Tons.	Tons.	Tons.
81,524	676,217	608,789	876	148,076

Statement of Residual Products.

Description.	In Store June 30, 1907.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store Dec. 31 1907.
Coke—cwts.	210,269	7,551,113	2,408,070	5,084,535	268,777
Breeze—yards	15,999	155,989	49,639	100,005	22,344
Tar—gallons	938,339	5,801,576	5,327,420	113,926	1,298,569
Ammoniacal liquor—butts	8,918	218,376	213,722	..	13,572

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights (estimated).	Private Lights (per Meter).		
Thousands.	Thousands.	Thousands.	Thousands.	
6,506,124	171,623	5,942,127	6,200,814	23,465 incandes't 15 flat flame

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal,

£105,782; coke and breeze, £13,091; tar, sulphate, and ammoniacal liquor, £36,427; and sundries, £290,214. The figures this time last year were: Coal, £61,527; coke and breeze, £10,611; tar, sulphate, and ammoniacal liquor, £55,299; and sundries, £275,126. A sum of £35,543, workmen's bonuses and savings, has been deposited with the Company; and the total of the officers' superannuation and guarantee funds is £43,927. The figures last year were £57,800 and £37,089. The item, "Monazite sand suspense account," now stands at £9669. compared with £19,420 at the end of December, 1906.

BRENTFORD GAS COMPANY.

The Half-Yearly Report and Accounts.

In the report which the Directors of this Company will present at the half-yearly general meeting on the 14th inst., they announce the very satisfactory increase of 7·01 per cent. in the sale of gas in the six months ending Dec. 31, as compared with the corresponding period of 1906, and also continued advance in the receipts for coke. Consequently, notwithstanding the high price ruling for coals, there was a considerable augmentation in the profit for the half year. The Directors have decided to undertake the maintenance of consumers' mantles and burners at a small quarterly charge; and they express the hope that this will meet a want which has been generally felt, and conduce still further to the popularity of gas lighting.

The accounts accompanying the report show that the revenue from the sale of gas amounted to £172,285; from meter and stove rents, to £18,166; and from the sale of residual products, to £38,458—rents and transfer fees making up a total of £228,948, compared with £207,514 in the corresponding period of 1906. On the other hand, the manufacture of gas cost £119,162; distribution, £37,259; and management, £6599—the total expenditure being £178,325, against £165,900. The balance carried to the profit and loss account is £50,624, compared with £41,614 this time last year. The amount available for distribution is £102,178; and the Directors recommend the declaration of dividends at the rates of 5, 12½, and 9½ per cent. per annum on the preference, consolidated, and new stocks respectively. The working statements show that 83,201 tons of Newcastle coal and 1,230,481 gallons of oil were used in the production of 1,362,237,000 cubic feet of gas, of which 1,241,850,000 cubic feet were sold and 1,256,850,000 cubic feet accounted for. The estimated production of residual products was: Coke, 52,070 tons; breeze, 6497 tons; tar, 1,015,730 gallons; ammoniacal liquor, 24,731 butts.

CAMBRIDGE GAS COMPANY.

A Well-Managed and Prosperous Undertaking.

The Half-Yearly Meeting of this Company was held last Tuesday at Cambridge—Mr. E. H. PARKER in the chair.

The SECRETARY (Mr. A. E. King) having read the notice convening the meeting, the report and accounts for the six months ending Dec. 31 were presented. The Directors stated that the trading in the half year had been satisfactory; and they recommended the declaration of dividends at the maximum rates. The accounts showed a sum of £21,276 available for this purpose; the amount carried to the profit and loss account having been £6568, compared with £6162 for the second half of 1906. The quantity of gas sold was 161,765,000 cubic feet, against 153,130,000 feet in the corresponding period of the preceding year; while the unaccounted-for gas was reduced from 18,539,000 to 16,862,000 cubic feet.

The CHAIRMAN, in moving the adoption of the report, remarked that the Company continued to prosper, as the shareholders would have gathered from the accounts. They would see that sufficient had been made to pay the fixed charges and the maximum dividends on the three kinds of stock, and leave a balance of £803 to the good. This result had been attained notwithstanding the fact that the Company were paying 2s. 5d. per ton more for coal, which, with a consumption of 33,000 or 34,000 tons, meant a large sum. The Company had sold 6,101,000 cubic feet more gas in the past half year than in the corresponding period of 1906; and the make of gas per ton of coal had been 11,222 cubic feet, against about 9500 cubic feet in the old days. The prosperity of the Company might, he thought, be assigned to the use of modern machinery which had been introduced at the works, and perhaps to even a larger extent to the energy of their Manager (Mr. J. W. Auchterlonie) and his staff. The increase in the number of consumers was very satisfactory, and was as follows: Ordinary consumers, 104; consumers using cookers, 19; heating-stoves, 68; slot-meters, 221; slot-cookers, 163. With regard to the future, if the Company could make satisfactory contracts for coal in May at a price not in excess of last year's, the Directors hoped to be able to announce a further reduction in the charge for gas; but until the state of the coal market was known, it was not thought prudent to lower the figure. A great deal might depend upon the Bill to restrict the working hours of miners to eight per day. If this Bill became law, there would probably be a decreased output, with a consequent rise in price. In conclusion, the Chairman mentioned that the Directors were negotiating for freehold premises in Sidney Street, which were required for offices, show-rooms, and workshops.

Mr. STANDLEY seconded the motion; and it was agreed to.

The maximum dividends were then declared; and a vote of thanks was accorded to the Chairman and Directors.

The AUDITOR (Mr. Tansley Witt) expressed his pleasure at watching the progress of the Company and its satisfactory course of procedure. He alluded to the great amount of work done in the office in collecting the details for his audit.

The CHAIRMAN, on behalf of the Directors, returned thanks, and remarked that the prosperity of the Company was very largely due to their energetic Manager, and to the accuracy and care with which the books were kept in the office of the Accountant (Mr. W. Lawson). The Company were greatly indebted to their staff.

APPRECIATION AT ROCHDALE.

A well-deserved mark of appreciation has just been shown to Mr. T. B. Ball, the Manager of the Rochdale Corporation Gas-Works, by his Committee, who decided to ask the Council to grant him an increase of salary, without Mr. Ball having made any application for it.

The subject, we learn, was raised in the Works Sub-Committee some time ago; and ultimately the Sub-Committee submitted a recommendation to the General Committee that Mr. Ball be granted an immediate advance of £50 a year, and two further increases of £25 per annum in the next two years. This recommendation was confirmed by a practically unanimous vote; and if the proposed advances are granted by the Council, they will bring Mr. Ball's salary up to £600 per annum three years hence. Mr. Ball, who went to Rochdale from Leeds, was appointed Manager of the gas-works in 1881, at a salary of £300; and it is twelve years since his remuneration was increased. It now stands at £500 a year. During the last twelve years, the works have, of course, been considerably extended, a carburetted water-gas plant has been installed, and the output has increased by 33½ per cent. The Committee therefore naturally feel that the increased work of the department, and the successful manner in which it has been conducted by Mr. Ball, deserve recognition.

GAS COMPANIES AND IRONMONGERS.

Pushing the Stove Trade.

At the recent Annual Dinner of the London and Suburban Ironmongers' Association, the President (Mr. F. J. Chubb) referred to the agreement which had been come to with the Gaslight and Coke Company on the subject of the supply of stoves, and said it was working to the great advantage of both parties. Another London Gas Company had been approached, and the suggestions of the Association had been cordially received. Some interesting gas lectures for ironmongers and their assistants had been arranged. In response to the toast of "The Visitors," Mr. F. W. Goodenough, the Chief Inspector of the Gaslight and Coke Company, said there were 77 ironmongers who had entered into arrangements with the Company; and the net value of the stoves they dealt with on behalf of the Company amounted to £2510. Seven out of the 77 ironmongers had been responsible for £1400 out of this amount. In other words, the minority had done more than half the work. Five more accounted for £285; so the majority of 65 ironmongers had done £785 worth of business among them. This proved only too conclusively that there was a considerable amount of apathy among London ironmongers in embracing a new idea. It had been the subject of reproach to the gas companies in the past that they had taken the ironmongers' business away from them. He thought this reproach was now removed, and if any of the 77 ironmongers he had mentioned would be as energetic as the seven, they would find that the cause for reproach was theirs and not the companies'. One great reason, to which insufficient weight had been attached, why the gas companies were obliged to take a great deal of this work into their own hands, was that for the pushing of gas-stoves in London it was absolutely necessary that a great proportion of them should be let on hire. They could let out ten stoves where they could only sell one. Now that the gas companies were giving ironmongers inducements for taking orders for stoves, they would find a great deal of business was to be done if they would put their backs into the work. With reference to Mr. Goodenough's remarks on the working of the agreement, Mr. R. H. Smith, the General Secretary of the Ironmongers' Federated Association, has written to the trade papers to point out that though the figures given by Mr. Goodenough were correct, they did not represent the actual result of the pushing of gas appliances by ironmongers. He says he was told by several of the members on the occasion of the dinner that their sales had largely increased in fittings and burners, but that these had in many cases been bought through manufacturers and factors. His object in writing is to assure Mr. Goodenough that the gas appliance business has been pushed, though all the sales have not gone through his Company.

RECENT GAS EXPLOSION AT BRADFORD.

Last Wednesday, at Bradford, the inquest was concluded on the body of Ann Holdsworth, a widow, aged 66, who was the occupant of one of several houses that were wrecked by an explosion which occurred on the 13th ult. through gas escaping from the main and coming into contact with a fire. As a result of the explosion, some of the tenants were severely shaken; and the deceased woman died two days later from heart failure accelerated by shock and removal from one house to another.

With reference to the cause of the explosion, a plumber named Powell stated that he called at one of the houses in question on the day of the accident. He arrived about mid-day, and noticed a strong smell of gas, which was also perceptible in the house adjoining. In seeking to locate the escape, he came to the conclusion that it was in the main before reaching the meter; the gas having previously been turned off there. He was told that people had communicated with the authorities at the Town Hall; and until the men from the Gas Department could be sent up, he advised that the doors of the houses should be kept open. Witness did not consider that there was any immediate danger, or likelihood of an explosion happening as soon as it did. F. Hirst, a tenant of one of the damaged houses, said that on reaching home about 11 o'clock on the morning of the accident, he noticed a strong smell of gas. The authorities were communicated with; and he understood that the men would be up to attend to the matter immediately after dinner. About 12.30 the explosion took place; and a number of the houses in the terrace were wrecked. The fire brigade attended, and extinguished the flames.

Matthew Hayes, Outdoor Superintendent of the Gas Department, stated that he visited the place after the explosion, and found that gas

was still escaping. The main was uncovered, and a crack was revealed in it. The pipes had been down from fifteen to sixteen years, and appeared to be in good condition—the crack being a recent one. The fault was probably due to subsidence and frost. Many such cracks were reported in the course of a year; the number depending on the length and keenness of the frost. During the last twelve months, they had had about 61 instances of gas-mains being cracked in over 400 miles of piping. Had there been a telephone message at the Town Hall at 11.45, he would have expected to have found a note to this effect in the book at the works in Mill Street. It was generally recognized that reports of this kind were on matters requiring immediate attention. Messages from the Town Hall to the works, he understood, related to serious escapes. Stop-taps were not as extensively used on gas-mains as was the case with water-services.

Mr. Charles Wood, the Gas Engineer to the Corporation, explained that the cost of putting in stop-taps at the end of every street would be between £30,000 and £40,000; and if they were inserted, a serious danger to the occupants of dwelling-houses would arise. If a tap were shut off in the street and the gas-tap in a house were left open, then there would be a grave danger of people being poisoned when the gas was turned on again.

E. C. Poughton, a Clerk in the gas office at the Town Hall, spoke to receiving a telephone message of a gas escape at 12.25 on the 13th inst. It was at once entered in the book; but being under the impression that the escape was not serious, the message was not telephoned on to the Mill Street works.

After consultation, the Jury said they were of opinion that death was due to heart failure accelerated by shock, and that there had been negligence on the part of some of the Gas Department officials, who were notified of the escape before 12 o'clock. This negligence, however, was not culpable. Mr. N. L. Fleming (of the Town Clerk's Department), in expressing the regret of the Gas Committee at the accident, and their sympathy with the relatives of the deceased woman, pointed out that even if the message had been telephoned at 11.45, as had been said, there would not have been time to do anything. Had workmen been sent right away, it would have taken them half-an-hour to get there, and a further forty minutes to dig down to the main; so that nothing on earth could have prevented the explosion. The Coroner said this was a point to which the Jury had better give serious consideration. He thought they should retire again and deliberate on the matter. The Jury accordingly again retired; and on returning said they considered the accident could not have been prevented if the workmen had set out at the time when the message was received, which was, in their opinion, before 12 o'clock. They still thought there was negligence on the part of the Corporation, and that there had been laxity somewhere.

ELECTRICITY SUPPLY AT WALTHAMSTOW.

Auditor's Severe Criticisms.

At the Meeting of the Walthamstow Urban District Council on Friday, the Auditor's report upon the accounts for the financial years ended March 31, 1906 and 1907, with the observations thereon of a Committee specially appointed to consider the matter, were received. The Auditor pointed out, in regard to the accounts of the electricity undertaking for 1905-6, that in two years £1474 had been carried to the relief of the rates. He was of opinion that this transfer was "entirely unjustifiable." The reply of the Committee is that the Council have not exceeded the powers conferred upon them by their Provisional Order. The Auditor directed attention to the fact that considerable sums had been spent on lamps, wire, &c., purchased for the purpose of being resold to consumers. He said no stock-book appeared to have been kept, making it practically impossible to exercise an audit check on the sales. The Council had persisted in their practice of using tramways money for electric lighting purposes. The Auditor was of opinion that the year's trading had resulted in a loss, and considered the amount of £200 charged to the undertaking in respect of officers' salaries and expenses to be quite inadequate. He also referred to the charge credited to the electric light undertaking and debited to the district fund in respect of public lighting; but the Committee stated that these charges had been reduced, and now compared favourably with those of other districts in the London areas. In regard to contracts, the Auditor observed that in numerous cases the Council appeared, without obvious reasons, to have rejected the lowest tenders, even where these were made to the Council's own samples. In his report on the accounts for the year ended March, 1907, the Auditor stated that the gross profit on the electricity undertaking was £6191, compared with £10,550 in the previous year. The Engineer estimated the cost of the current supplied to the tramways undertaking to have been rather over 1⅛d. per unit; and he justified the charge of 1⅛d. per unit actually made by observing that "the electricity undertaking has benefited to some extent from the use of money taken up under the tramways loan." The Auditor remarked that it was an undoubted fact that the electricity undertaking had so benefited to a considerable extent; but he said the proper course to adopt would have been to charge against the respective undertakings ascertainable liabilities, and not fictitious amounts leading to inaccurate and misleading profit and loss accounts.

Increased Consumption of Gas at Budleigh Salterton.—A rapid increase in demand for gas at the Devonshire seaside resort Budleigh Salterton was referred to yesterday week at a meeting in Exeter of the shareholders in the Budleigh Salterton Gas Company, Limited. The meeting was called for the purpose of approving the issue of additional shares to the value of £3000 for the extension of the works. Mr. A. S. Perkins, the Chairman of the Company, said they were putting up a new retort-house and extending the works generally. They had a number of new customers, and were doing remarkably well. In 1898 the total quantity of gas sold was 2,802,000 cubic feet; whereas in 1906 it was 5,437,000 cubic feet. The consumption was still increasing. The Secretary (Mr. J. Galt) said that when the work now in hand was done, everything about the works would have been renewed in the past ten years. The necessary resolution was passed.

METROPOLITAN WATER BOARD.

Death of the Comptroller—Quality of the Water.

The First Meeting of the Board after the Christmas recess took place last Friday—Sir Melvill Beachcroft in the chair. Prior to the commencement of the ordinary business, Lord Welby, the Chairman of the Finance Committee, at the request of Sir Melvill, moved the following resolution: "That this Board have received with the deepest regret the news of the death of Mr. F. E. Harris, the Comptroller, and desire to convey to his widow and family profound sympathy in their sad bereavement, and, further, to place on record their high appreciation of the valuable services which he rendered to the Board and to the Metropolis." His Lordship expressed his appreciation of what Mr. Harris had done for the Board and of his ability in dealing with financial matters. The Chairman, on behalf of the members of the Board, seconded the motion, and remarked that it was impossible to exaggerate the loss they had sustained by the death of their Comptroller. The motion was passed; all the members rising in their places. The Water Examination Committee presented the reports of the Director of Water Examinations for the months of November and December last, as to the condition of the raw and filtered waters. They showed that the number of routine samples of water examined at the laboratory was 965 in November and 834 in December. Of these samples respectively, 699 and 622 were examined bacteriologically and 266 and 232 chemically. With regard to bacteriological results, the best in November were shown by the samples collected in the Chelsea, Grand Junction, West Middlesex, and Kempton Park districts, all of which were above 90 per cent.; the best samples in December came from the Kempton Park, East London, and New River districts. As to the chemical analyses, judging the water by its organic impurity in relation to its own average for the year 1906, the filtered water in November yielded, with the exception of the New River and East London results, worse than the average; while in December the results, with the exception of those from the Grand Junction (Hampton) district, were also worse than the average. The Works and Stores Committee presented a report dealing with the proposed reservoir in the Lea Valley, for the construction of which the Board had approved an estimate of £548,000. The Committee recommended that the tender of Messrs. Wall, Limited, of £340,770 (the lowest received), for the construction of the reservoir, should be accepted; and this was agreed to.

The *agenda* contained statistical particulars in regard to the supply of water in the Metropolis in November and December last. The figures for the first-named month were as follows: Average daily supply, 212,255,000 gallons; number of houses, &c., supplied, 1,073,432; estimated population, 6,957,522; mean supply per head per day, 30·5 gallons; water in store in impounding reservoirs, 5,681,000,000 gallons; number of additional supplies, 1209; and length of mains laid, 11,001 yards. For December the figures were: Average daily supply, 205,955,000 gallons; number of houses supplied, 1,045,965; estimated population, 6,964,669; mean supply per head per day, 29·5 gallons; water in store, 5,826,000,000 gallons; number of additional supplies, 745; and length of mains laid, 5401 yards.

EXMOUTH WATER SUPPLY.

Report by Messrs. George H. Hill and Sons.

The Exmouth Urban District Council recently had a special meeting at which a report by Messrs. Hill and Sons on the water supply of the town was under consideration. They stated that the population in 1931 could not be assumed at a lower figure than 18,000; and, contemplating a consumption of 30 gallons per head in the future, there would be a demand in the year named of 555,000 gallons, and the deficiency already experienced would be increased to nearly 300,000 gallons a day. After offering some suggestions for increasing the supply, Messrs. Hill added that there was no source within a reasonable distance of Exmouth from which water could be obtained by gravitation, and they thought it would be to the advantage of the Council to consult Professor Boyd Dawkins as to the suitability of the geological formation for obtaining the necessary water by pumping, and to authorize them to visit the ground with him, so that the alternative might be fully considered. The capital outlay on a small pumping plant would probably be much less than that involved in the construction of an impounding reservoir, had such been practicable; and, as pumping would only be resorted to in order to make up the existing supply when deficient, the annual charges would probably be much less than in the case of a gravitation scheme.

The Rev. O. Reichel expressed regret that the report had not been considered by the Sanitary Committee before it was presented to the Council. It went to show that the present water sources were not sufficient to supply a population of 18,000 in 1931. But at the rate they were going on it would be many years before the population of Exmouth reached 18,000; and he thought in making provision for this number they would be looking farther ahead than they should do. He also thought there were Devonshire geologists who were more familiar with the Devon strata than Professor Boyd Dawkins. He therefore moved that the report be referred to the Sanitary Committee. Mr. T. Hallett seconded the motion. Mr. G. F. Perriam remarked that they should not lose the opportunity of securing any available watershed in the neighbourhood, because if it was decided that pumping-stations should be built, the quantity of water they could get was quite problematical; and they could always come back to the pumping-station after they had secured a watershed they could use. Mr. T. Abell moved, as an amendment, that the suggestion in the report should be carried out. This was agreed to; and Messrs. Hill and Sons were left to engage Professor Boyd Dawkins.

A woman named Pullen, living at Worthing, was fined 30s. in November last for stealing money from her prepayment meter. This, however, did not deter her from committing a similar offence a few days ago, for which she was sentenced to three weeks' imprisonment.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Edinburgh and Leith Gas Commissioners had little business before them at their monthly meeting on Monday last. The report of the Engineer showed an increased output of gas, since the 16th of May, of 15,348,000 cubic feet. The Commissioners were unfortunate in having one of their workmen killed in the yard at Granton, through being crushed between two coal-waggons in the darkness of the night on Dec. 17. They never disputed their liability to pay compensation to the widow and family of the deceased; and the Works Committee reported that they had authorized the payment of £226 9s. 6d.—being a sum equal to the deceased's wages for three years prior to the accident. A memorandum of the agreement was, in terms of the Workmen's Compensation Act of 1906, recorded in the books of the Edinburgh Sheriff Court. The Finance and Law Committee put forward the recommendation of a sub-Committee of their number, to the effect that power should be asked, in the Provisional Order which is being promoted by the Commissioners, to grant sick allowances to workmen. Judge Mallinson said the recommendation was a unanimous one. The contribution would be to the funds of the Workmen's Sick Benefit Society.

The Aberdeen Corporation Gas Committee had before them on Wednesday a report by the Engineer and Manager—Mr. S. Milne-in which it was pointed out that the present plant at the gas-works is capable of producing little more gas than is required for the needs of the city. The Committee, adopting the report, agreed to recommend the Council to introduce a carburetted water-gas plant, to produce 1½ million cubic feet of gas a day; the estimated cost being £7000.

The Eastern Juniors in Scotland have every reason to be gratified with their visit this afternoon to the works of Messrs. R. & A. Main, Limited, at Falkirk. They saw much which would have interested them had they only been accorded a casual glimpse of the processes in use; but they were not only shown what was going on—they had it explained to them. The works are run upon strict scientific and commercial lines; and, consequently, any information which was derived by the visitors they may regard as being of the most up-to-date nature. The frank and free communication of information was a feature of the visit. Another was the cordiality of the reception, by reason of which everyone was made to feel that the spirit which dominates the place is a desire to help forward every movement for bettering the gas industry. Truly, the young gas engineer has advantages which but a few years ago existed, if at all, only in imagination.

The Dumfries Town Council recently carried through the inspection of the new sulphate of ammonia plant erected in the gas-works, referred to in these "Notes" on the 21st ult. The ceremony began at eleven o'clock—a circumstance which bespeaks it as having been a strictly business affair. The plant was in full operation. It is of the continuous, low-pressure type, and is capable of producing 135 tons of sulphate per annum. The liquor is pumped into an elevated tank, capable of containing 7000 gallons. From the tank it gravitates to the heater, and into the still, half-way down which the liming process is introduced.* After the inspection, Provost Glover said that, like many other things, the sulphate plant received some opposition at the beginning, or, at least, very little support. It was after many inquiries at different places that he found the making of sulphate of ammonia was past the experimental stage, and was a great success. As Convener of the Gas Committee, he had felt that it would be suicidal policy to allow £500 per annum to be lost for want of such a plant. There was no reason why they should not make the manufacture of sulphate a success. They had already nearly £50 worth of sulphate on sale. There was a large demand for it among agriculturists; and he thought that in Dumfries there would be a big sale for the bulk of the production not far from their own doors. Bailie Thomson, who has been Sub-Convener, and who seems to be now Convener of the Gas Committee, said that the gas undertaking had come to be one of the most successful things they had in the town of Dumfries. It was fully ten years since he entered the Gas Commission. In 1898, they made 72 million cubic feet of gas; during the past year they made 107 millions—an increase of 35 million cubic feet. In 1898, the quantity of coal carbonized was 7000 tons; last year it was 11,000 tons. The income in 1898 was £11,871; last year it was £16,827—an increase of about £5000. So they would see they were on the highway to prosperity. They had a debt of £30,000 on the gas-works; but they had works worth at least £90,000. He thought, therefore, they should congratulate themselves upon the position they were in. In the course of the proceedings, Mr. J. H. M'Gowan, the Burgh Chamberlain, said he had probably the earliest connection with the management of the gas-works of any gentleman present, as he had been Secretary of the Maxwelltown and Dumfries Gas Company, and also was Liquidator of the Company before it coalesced with the Dumfries Company, and was absorbed by the Corporation. Probably not half-a-dozen in the company that day recollected when there were two Gas Companies. One was called the Dumfries and Maxwelltown Gas Company, and the other the Maxwelltown and Dumfries Gas Company. Pipes were laid through both towns by each Company, and there was an immense amount of competition. The Dumfries Company was considered the aristocratic concern; the shares being held by leading men of considerable means. The Maxwelltown and Dumfries Company was got up for the purpose of reducing the price of gas, which was high when the Dumfries Company had the monopoly. The shares were subscribed for by shopkeepers and working men. He was appointed Secretary of the Maxwelltown Company, and continued to act in this capacity till it was found that there were no further dividends to be had. The Company was then wound up. It would be about fifty years ago that he divided the profits, and was able to pay a small dividend to each of the shareholders. It was probably on account of this connection that ex-Provost Lennox appointed him first Treasurer of the Corporation gas-works. After testifying to the pleasure he had had in serving in this capacity, Mr. M'Gowan concluded by saying he had a great admiration for the way in which the gas-works had been conducted by their present Manager—Mr. G. Malam.

* An illustrated description of the plant will be found on p. 286.—ED. J.G.L.

Sale of Stock of the Richmond Gas Company.—At the Greyhound Hotel, Richmond, last Tuesday, Messrs. Chancellor and Sons sold £800 of stock of the Richmond Gas Company at from £125 to £127 10s. per £100 of stock. The Company are paying 5¼ per cent. dividend with gas at 2s. 10d. per 1000 cubic feet.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 281.

Issue.	Share	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
500,000	10	Oct. 11	10½	Alliance & Dublin 10 p.c.	19½—20½	..	5 2 5
268,324	?0	,,	7½	Do. 7 p.c.	14—15	..	5 0 0
310,000	Stk.	Jan. 16	4	Do. 4 p.c. Deb.	97—99	..	4 0 10
200,000	5	Oct. 30	7	Bombay, Ltd.	6¾—6¾	..	5 3 8
40,000	5	,,	7	Do. New, £4 paid	4¾—5	..	5 12 0
50,000	10	Aug. 29	14	Bourne-mouth Gas and Water } 10 p.c.	27½—28½	..	4 18 3
51,810	10	,	7	B 7 p.c.	16½—17	..	4 2 4
53,200	10	,,	6	Pref. 6 p.c.	14½—15½	..	3 17 5
380,000	Stk.	Aug. 15	12½	Brentford Consolidated	247—252	..	4 19 2
300,000	,,	,,	9½	Do. New	185—190	..	5 0 0
50,000	,,	,,	5	Do. 5 p.c. Pref.	120—125	..	4 0 0
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb.	100—105	..	3 16 2
220,000	Stk.	Sept. 27	11½	Brighton & Hove Orig.	200—210	..	5 7 1
246,320	,,	,,	8½	Do. A. Ord. Stk.	153—158	..	5 4 5
460,000	20	,,	10	British	42-44	+½	4 13 0
104,000	Stk.	Aug. 15	6	Bromley, Ord. 5 p.c.	118—121	..	4 19 2
165,700	,,	,,	4½	Do. do. 3½ p.c.	88—91	..	4 18 11
500,000	10	Oct. 11	7	Buenos Ayres (New) Ltd.	11¼—11¾	+¼	5 19 2
250,000	Stk.	Dec. 13	4	Do. 4 p.c. Deb.	91—93	+1	4 6 0
150,000	20	July 12	8½	Cagliari, Ltd.	26—27	..	6 2 3
100,000	10	—	—	Cape Town & Dis., Ltd.	6—8	..	—
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.	7—9	..	5 0 0
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	48—50	..	6 0 0
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	92—91	..	4 15 9
157,150	Stk.	Aug. 15	5	Chester 5 p.c. Ord.	108—110	..	4 10 11
1,443,280	Stk.	,, 29	5⅛	Commercial 4 p.c Stk.	104—109	..	4 15 5
560,000	,,	,,	5	Do. 3½ p.c. do.	101—106	..	4 14 4
475,000	,,	Dec. 13	3	Do. 3 p.c. Deb. Stk.	82—84	+1	3 11 5
800,000	Stk.	,,	6½	Continental Union, Ltd.	107—112	+1	5 16 1
220,000	,,	,,	7	Do. 7 p.c. Pref.	135—140	..	5 0 0
460,170	Stk.	—	5½	Derby Con. Stk.	122—123	..	4 9 5
55,000	,,	—	4	Do. Deb. Stk.	105—105	..	3 16 2
148,995	,,	—	—	East Hull 5 p.c. Ord.	101—104	..	—
486,090	10	Jan. 30	12	European, Ltd.	22—23*	..	5 4 4
354,060	10	,,	12	Do. £7 10s. paid	16—17*	..	5 5 11
15,181,590	Stk.	Aug. 15	4⅛	Gas-light and Coke } 4 p.c. Ord.	99—101	+1½	4 7 2
2,600,000	,,	,,	3½	3½ p.c. max.	87—89	+1	3 18 8
3,799,735	,,	,,	4	4 p.c. Con. Pref.	104—107	+1	3 14 9
4,193,975	,,	Dec. 13	3	3 p.c. Con. Deb.	82—84	..	3 11 5
258,740	Stk.	Sept. 13	5	Hastings & St. L. 3½ p.c.	93—95	..	5 2 0
82,500	,,	,,	6½	Do. do. 5 p.c.	114—117	..	5 11 1
70,000	10	Oct. 11	11	Hongkong & China, Ltd.	19—20	..	5 10 0
4,940,000	Stk.	Nov. 14	8	Imperial Continental	181—184	+2	4 7 0
473,600	Stk.	Aug. 15	3½	Do. 3½ p.c. Deb. Red.	93—95	..	3 13 8
195,242	Stk.	Aug. 29	6	Lea Bridge Ord. 5 p.c.	115—120	..	5 0 0
£			p.c.				£ s. d.
551,000	Stk.	Aug. 29	10	Liverpool United A	223—225	+1	4 8 11
718,100	,,	,,	7	Do. B	162—164	..	4 5 4
306,083	,,	Dec. 30	4	L'rpool Unit'd Deb. Stk.	106—108	..	3 14 1
152,736	Stk.	Feb. 14	7⅞	Maidstone 5 p.c.	140—145	..	5 5 2
75,000	5	Nov. 28	5	Malta & Medn., Ltd.	4—4½	..	5 11 1
560,000	100	Oct. 1	5	Met. of } 5 p.c. Deb.	101—103	+1	4 17 1
250,000	100	,,	4½	Melbourne } 4½ p.c. Deb.	101—103	..	4 7 5
541,920	20	Nov. 14	3½	Monte Video, Ltd.	10½—11½	..	6 1 9
1,775,892	Stk.	Aug. 15	4⅜	Newc'tle & G'tesh'd Con.	107—108	..	4 5 8
406,025	Stk.	Dec. 31	3½	Do. 3½ p.c. Deb.	86—83	..	3 19 7
15,000	10	Aug. 29	10	North Middlesex 10 p.c.	19½—20½	..	4 17 7
55,940	10	,,	7	Do. 7 p.c.	13—14	..	5 0 0
300,000	Stk.	Nov. 28	8	Oriental, Ltd.	137—140	+2	5 14 4
60,000	5	Sept. 13	7	Ottoman, Ltd.	6—6½	..	5 7 8
398,490	5	Oct. 30	7	Primitiva Ord.	6¾—7¼	..	4 16 7
796,980	5	Jan. 30	5	Do. 5 p.c. Pref.	4⅞—5⅛*	+⅛	4 17 7
488,900	100	Dec. 2	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
1,000,000	10	Oct. 11	8	River Plate Ord.	13½—14	..	5 14 4
312,650	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
250,000	10	Sept. 27	8	San Paulo, Ltd.	13—13½	..	5 18 6
125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	49—51	..	4 18 0
135,000	Stk.	Sept. 13	10	Sheffield A	244—246	..	4 1 4
209,984	,,	,,	10	Do. B	244—246	..	4 1 4
523,500	,,	,,	10	Do. C	244—246	..	4 1 4
70,000	10	Nov. 14	10	South African	14½—15½	..	6 9 0
6,429,895	Stk.	Aug. 15	5⅜	South Met., 4 p.c. Ord.	125—127	+1½	4 6 8
1,895,445	,,	Jan. 16	3	Do. 3 p.c. Deb.	82—84	..	3 11 5
201,720	Stk	Sept. 13	8	South Shields Con. Stk.	154—156	..	5 2 7
605,000	Stk.	Aug. 15	5½	S'th Suburb'n Ord. 5 p.c.	118—121	..	4 10 11
60,000	,,	,,	5	Do. 5 p.c. Pref.	120—12	..	4 1 4
117,058	,,	Jan. 16	5	Do. 5 p.c. Deb. Stk.	120—125	..	4 0 0
502,310	Stk.	Nov. 14	5	Southampton Ord.	104—109	..	4 11 9
120,000	Stk.	Aug. 15	6⅔	Tottenham and } A 5 p.c.	120—123	..	5 9 9
398,940	,,	,,	5⅓	B 3½ p.c.	100—103	..	5 1 11
149,470	,,	Dec. 13	4	Edmonton } 4 p.c. Deb.	97—100	..	4 0 0
182,380	10	Dec. 30	8	Tuscan, Ltd.	10¼—10¾	..	7 8 10
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	98—100	..	5 0 0
193,742	Stk.	Aug. 29	5	Tynemouth 5 p.c. max.	107—109	..	4 11 9
30,000	Stk.	Feb. 14	8	Wandsworth and Putney } A 5 p.c.	—	..	—
255,636	,,	Aug. 15	6⅔	B 3½ p.c.	128—133	..	4 17 9
75,000	,,	,,	5⅝	C 3½ p.c.	—	..	—
80,075	,,	Dec. 30	3	3 p.c. Deb. Stk.	73—73	..	3 16 11
845,872	,,	Aug. 15	5⅛	West Ham 5 p.c. Ord.	101—104	..	4 19 6
185,000	,,	,,	5	Do. 5 p.c. Pref.	118—120	..	4 3 4
228,300	,,	Dec. 30	4	Do. 4 p.c. Deb. Stk.	102—107	..	3 1 9

Prices marked * are "Ex div."

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *Feb.* 1.

There has again been a good demand for immediate delivery, and prices at all points have been maintained; but there has been no advancee in prics, and the tone is quieter at the close, the month's contracts being covered. The quotations are £11 17s. 6d. to £11 18s. 9d. per ton f.o.b. Hull, £11 18s. 9d. to £12 per ton f.o.b. Liverpool, and £12 2s. 6d. per ton f.o.b. Leith. Though there continues to be a fair amount of inquiry for delivery over the spring months, there has not been much first-hand business; buyers' ideas being still on the level of spot prices, and fully 2s. 6d. per ton below what makers require.

Nitrate of Soda.

This article is firmer in all positions, and spot prices have advanced to 11s. 3d. per cwt. for 95 per cent. and 11s. 7½d. for refined quality.

Tar Products. LONDON, *Feb.* 3.

Pitch is unchanged for prompt and forward delivery, and is very dull. Makers have offered at 20s. per ton on the east coast, but without success; while the best makes have been offered in London at 21s. 6d. without finding buyers. In the forward position, makers are naturally not at all anxious to make delivery at the existing low prices; and it is reported that Continental pitch has been sold for delivery to the end of next year at very low figures. Creosote remains unchanged. For immediate delivery in London, 2⅝d. would be accepted; but makers ask higher prices than these for forward, and in some cases are securing very good figures for delivery to the end of the year. In the Midlands, oil is still firm, as is the case in the Yorkshire and Lancashire districts. There is no alteration in 90 per cent. benzol. It is still possible to do business in London at 8¾d.; but in the North 8d. has been accepted. Benzol 50-90 per cent. and toluol are without much interest to consumers, who have still heavy stocks of these articles. Solvent naphtha is quiet. In London, for delivery all over the present year, 10½d. has been accepted; while in the North it is reported that 9d. per gallon has been taken on the east coast. For high-flash naphtha there is no demand at present. Carbolic acid is quiet. Continental consumers decline to offer more than 1s. 6½d. for 60's; but it is stated that dealers have paid 1s. 7d. to the end of June.

The average values during the week were: Tar, 12s. 9d. to 16s. 9d., *ex* works. Pitch, London, 20s. 6d. to 21s.; east coast, 19s. 6d. to 20s.; west coast, 18s. 6d. to 19s. 6d. f.a.s. Benzol, 90 per cent., casks included, North 8d. to 8¼d., London 8½d. to 8¾d.; 50-90 per cent., casks included, North and London 8d. to 8½d. Toluol, casks included, North and London 9½d. to 9¾d. Crude naphtha, in bulk, North 3½d. to 3¾d., London 3¾d. to 4d.; solvent naphtha, casks included, North 9d. to 9⅜d., London 10d. to 10⅜d.; heavy naphtha, casks included, North 10d. to 10½d., London 10½d. to 11½d. Creosote, in bulk, London 2⅝d. to 2¾d., North 2½d. to 2⅝d. Heavy oils, in bulk, 3d. Carbolic acid, 60 per cent., casks included, east coast 1s. 6¾d. to 1s. 7d., west coast 1s. 6½d. to 1s. 6⅝d. Naphthalene, £6 10s. to £10 10s.; salts, 42s. 6d. to 47s. 6d., packages included and f.o.b. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article continues firm. The quotations of the London Gas Companies are unchanged. Business is said to have been done in one of the best of the outside makes on Beckton terms at £12 per ton. The ordinary qualities would not command more than £11 17s. 6d. In Hull, the best makes have been sold at £12; and £11 17s. 6d. to £11 18s. 9d. has been accepted for ordinary qualities. In Liverpool, business is reported at £12 for ordinary makes, and £12 1s. 3d. to £12 2s. 6d. for the best. In Leith, very little business has been done; makers being exceedingly well sold to the end of March. It is reported that £12 3s. 9d. has been paid for some quantity for early delivery.

COAL TRADE REPORTS.

Lancashire Coal Trade.

There is nothing new to report in the condition of the Lancashire coal trade. Prices remain firm; and the demand is almost more than can be supplied. Reports from the Yorkshire coalfields are equally satisfactory. The reductions announced in South Wales and the North do not affect this county. The class of coal is not the same, and is applied to a large extent to different uses. As the season advances, coal may be cheaper; but there are no signs of this at present. The rise in prices here, which were looked for in the early part of January, was only kept back by a narrow majority of votes on the part of coal-owners. Gas coal is still in good request. Coke is steady. Slack and engine fuel are firm.

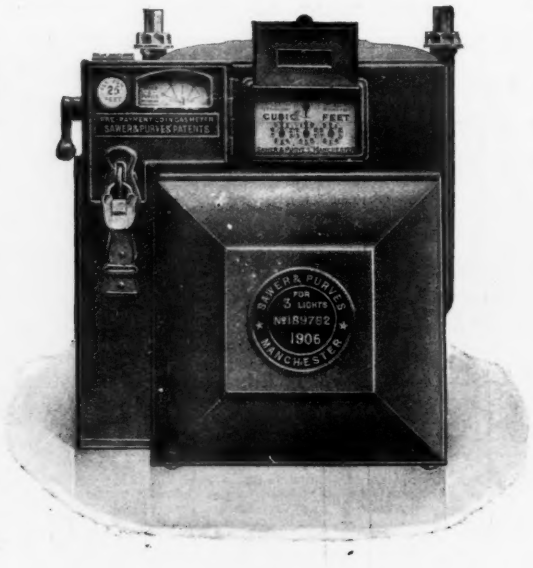
Northern Coal Trade.

There has been further ease in the coal trade—partly due to the non-arrival of steamers at the coal shipping ports, and partly to the lessened demand with milder weather. In steam coals, the prices are lower. Best Northumbrians are quoted from about 12s. 3d. to 12s. 6d. per ton f.o.b., second-class steams are 11s. to 11s. 3d., and steam smalls are from 6s. to 6s. 6d. The collieries are generally working well; but there is an occasional idleness, through the non-arrival of tonnage already referred to. In the gas coal trade, there is less pressure in the demand, and in a few cases prices have shown a little ease. Generally, however, the inquiry is full; and the deliveries continue at a heavy rate—occasional "hard" weather increasing the consumption. Durham gas coal varies from about 12s. to 13s. 6d. per ton f.o.b., according to quality. There are now more contracts in course of negotiation. One, for some 20,000 tons, was settled on the basis of 19s. 2d., delivered at

THE POSITIVE PREPAYMENT METER

WET AND DRY.

ANY SIZE FOR ANY COIN.



SAWER AND PURVES,

MILES PLATTING, MANCHESTER. *Scotch Representative:* JNO. D. GIBSON, 93, Hope Street, GLASGOW. RADFORD ROAD, NOTTINGHAM.

Porto Vecchio—equal to about 12s. 2d. per ton f.o.b., with the usual allowances for freight. The Gothenburg contracts are also in the market, and it is believed they are settled, though the price is not yet made known. The coke market is quiet; but gas coke is plentiful, and may be quoted from 18s. per ton f.o.b. on the Tyne or the Wear.

Scotch Coal Trade.

The market is reported to show signs of weakness. The demand for shipment continues to be the slackest part of the business, the only brisk foreign request being for ell of the best qualities. Splint is getting plentiful, with the result that a reduction in price is regarded as imminent. The smaller sorts are plentiful, and are difficult to dispose of. The prices quoted are: Ell 12s. 6d. to 13s. 0d. per ton f.o.b. Glasgow, splint 13s. 6d. to 13s. 9d., and steam 12s. 3d. to 12s. 6d. The shipments for the week amounted to 261,378 tons—an increase of 54,858 tons upon the preceding week, and of 848 tons upon the corresponding week of last year. For the year to date, the total shipments have been 728,787 tons—a decrease of 259,219 tons upon the corresponding period of 1907.

Public Gas Lighting at Tottenham.

The Tottenham Urban District Council recently requested the Engineer to look into the question of the efficiency of the lighting of the public lamps where the Rostin system of automatic lighting is in operation. He has now reported to the General Purposes Committee of the Council that he is quite satisfied that the system (which has been in use in certain portions of the district for some 2½ years, during the whole of which time it has been under his careful observation, is an efficient one, and that no reasonable objection can be taken to it. The lighting of the district generally, however, is not good. This applies not only to the area covered by the automatic lighters, but also to that which is controlled by the hand-lighting system. Having been at some trouble to ascertain the cause of this, he says he can only ascribe it to the condition of some of the burners; and he recommends that the Gas Company should be requested to introduce some system of periodically changing these and the mantles, and that their attention should be drawn to the defective lighting in some of the streets. The Committee endorse the Engineer's suggestions, and they are to be carried out.

Lively Electricity at Hull.—Last Friday, one of the streets in Hull was considerably enlivened, at about nine o'clock in the morning, by the fusing of an underground electric light cable, which caused an explosion, accompanied by dense smoke and sheets of flame. Fortunately, the material damage appears to have been merely an ignited shop front and a broken window, though no doubt there was a good deal of consternation among the people to whom such an experience may have been a novelty.

Working at High Pressure at Abergavenny.

According to a report by the Manager of the Abergavenny Gas-Works (Mr. A. Kyle), presented by the Gas Committee at the last meeting of the Town Council, they have lately been working at high pressure in order to keep up the supply of gas to the town. This is evidenced by the following extract from the report: "On one or two occasions the whole of the town was very nearly thrown into total darkness, particularly so on the 4th of January, when at 11 p.m. we had only 10,000 cubic feet of gas in stock. On this night some of the charges were put into the retorts before the previous ones were burnt off, and by this means we were just able to keep the holder up. This continual rush for the last three months has necessitated all the men working as long and as hard as possible; and it was only by means of overtime that we were enabled to get through the necessary ordinary work. So much pushed were we at times, that the ordinary tidying up of the yard, the cleaning of cookers, repairs to machinery, &c., were left over for more important and absolutely necessary work, so that if it were possible on our part there should be no complete failure of the gas supply. In the ordinary course, it is customary to stop the works over Sundays; but so large has been the demand for gas that since the beginning of September we have had to work every Sunday, and machinery that ought to have been stopped for repairs has had to be continually running ever since, and will have to keep on running until the new retorts are at work, and the stock is sufficiently large to enable us to stop work on Sundays, when the engines, pumps, boilers, &c., and other portions of the plant, can be thoroughly overhauled, and the necessary repairs made." The report was approved.

Power-Gas Corporation.—The report of the Directors for the year ended Sept. 30 last states that the year's trading of Messrs. Ashmore, Benson, Pease, and Co., Limited, shows a profit of £501, after contributing £3500 for interest to the Corporation on its advances. The works have been fairly well employed during the year, and are busy at the present time. The A.B.P. Accumulator Company, Limited, has now been liquidated voluntarily, involving a net loss of £16,822, which has been temporarily placed to a suspense account in the books of Messrs. Ashmore, Benson, Pease, and Co., Limited. The Directors have recently had the land, buildings, plant, and machinery of this Company re-valued, and they find that certain items have considerably depreciated in value, chiefly owing to the extensive alterations and additions made from time to time in the remodelling of the works. They believe it will be a sound policy to write these down to their true value. The majority of the holders of the deferred shares have agreed, on certain terms, that the whole of the loss should be written off their shares. This course involves some alteration of the Company's Articles of Association. In consequence of the unsatisfactory results of the year's trading, the Directors have decided to waive their fees for the year. There is a balance to the credit of the profit and loss account of £253, which the Directors propose to carry forward.

RICHMOND'S GAS APPARATUS

has recently been ordered for

BUCKINGHAM PALACE THE RESIDENCE OF H.M. the KING.

Advertisement of the RICHMOND GAS STOVE & METER CO., LTD.

London Offices and Show-Rooms: 132, Queen Victoria Street, E.C. General Offices and Works: Warrington, &c.

Walker and Wallsend Gas Company.

The annual report of the Directors of the Walker and Wallsend Gas Company states that the balance of undivided profits as per the last statement was £4493, and the balance of profits for 1907 was £11,488, making a total of £15,981. It is proposed to appropriate this sum as follows: Interest on mortgages, reserves, &c., £2223; to the credit of depreciation fund, £1575; and to the payment of dividends at the rates of 5 per cent. on the preference stock, 4⅞ per cent. on the ordinary 3½ per cent. stock, and 6⅜ per cent. on the ordinary 5 per cent. stock—all less income-tax. This will leave a balance to be carried forward to next year's account of £4554. There is an increase in the receipts as compared with last year of £2820, and an increase in the expenditure of £2450. The increase in the sale of gas, and in the number of consumers, still continues; and, but for the large rise in the price of coals over part of the year, more favourable results would have ensued. The cost per ton of coal carbonized for the first half of the year was 10s. 1·51d. and for the second half 13s. 3·15d., or an increase of 3s. 1·64d. In consequence of this great advance, the Directors have given notice to the consumers of gas by ordinary meters only that the price will be increased from 2s. 3d. to 2s. 6d. per 1000 cubic feet, with discounts as usual; thus reverting to the price charged previous to the last reduction. The increase comes into operation from the commencement of the present year; and, in accordance with the sliding-scale of the Company's Act of Parliament, the dividends on the ordinary stocks of the Company will be reduced 7s. 6d. per cent. The capital account has been increased by the expenditure of £27,639, of which sum £24,242 is on account of the new works at Howdon Lane, which are nearing completion. It is hoped to commence operations in the new works during the approaching summer, when great saving in manufacturing results will follow. This expenditure has been met by the issue of preference stock and mortgages. The manufacture of gas at the leasehold works at Willington Quay and Walker will be gradually discontinued as the new freehold works at Howdon Lane are utilized.

Durham Gas Company.—The report of the Directors of the Durham City Gas Company shows an available profit balance for the half year just ended of £2387; and this being insufficient to pay the ordinary dividend, it is recommended that £282 be taken from the reserve fund, and a dividend of 5 per cent. on the original and 3½ per cent. on the additional capital declared, making 10 and 7 per cent. respectively for the year. The reserve fund at present amounts to £4226.

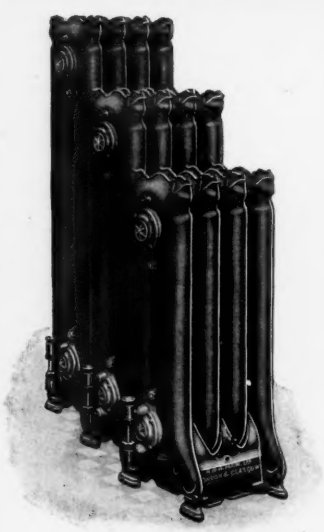
Increased Gas Consumption at Stourbridge.—On the Gas Committee asking the Stourbridge Urban District Council for permission to apply to the Local Government Board for sanction to borrow £6000 for the extension of the gas-mains to Clent, the provision of a cooker repairing shop, a new station meter, and other matters, Mr. C. H. Webb (the Engineer) stated that the increase in the gas consumption was shown by the following figures: In 1885, the annual production was 60 million cubic feet; in 1895, it was 100 millions; in 1900, it was 153 millions; in 1905, it was 192 millions; in 1907, it was 207 millions; and he estimated that this year it will be 212 millions.

Fatal Gas Explosion at Bologna.—According to a telegram from the correspondent of the "Daily Telegraph" at Bologna, a serious explosion of gas occurred last Thursday in a tavern situated outside the San Vitale gate. While the hostelry was crowded with customers, one of the sons of the proprietor detected a strong smell of gas. Lighting a candle, he attached it to the end of a long stick, and began passing it along all the gas-pipes in order to discover the escape. He found it; and soon afterwards there was a terrific explosion. The walls of the tavern which faced the street collapsed, raising a dense cloud of dust and smoke. In the *débris* were buried the members of the proprietor's family—the father, mother, and five children—as well as all the people who were in the place at the time. Hearing the noise of the explosion and the cries of the victims, a large crowd soon gathered on the scene. Rescue work was immediately organized, and after labour lasting several hours, two dead bodies and twelve injured persons were extricated.

Accidents to Gas-Mains.—Sewering operations led to a somewhat alarming incident in Regent Street, Plymouth, on Saturday week. The disturbance of the ground caused the gas-main to leak, and there appears to have been a great accumulation of gas, for when the night watchman was hanging out warning lamps round the excavation, a huge sheet of flame shot up from the ground and enveloped the roadway for a considerable distance. A large crowd was attracted by the spectacle, and as the flames were spreading the police and firemen were called. Water was poured on to the flames from a neighbouring hydrant, and eventually they were extinguished. In the meantime, information had been given to the gas-works, and workmen were sent to the spot who soon stopped the leakage and put an end to further danger. Last Tuesday, some alarm was caused by an explosion which occurred in Mare Street, Hackney. While workmen were employed repairing a gas-main, a quantity of gas suddenly exploded, blowing up the roadway and doing other damage. Two of the men were injured.

Public Lighting of Baildon.—A short time ago, the Baildon Urban District Council wrote to the Shipley Gas Committee (from whom they derive their supply of gas) stating the times of lighting the street-lamps in Baildon during the year 1908. In 1906, the lamps in Baildon were lighted 3839 hours; in 1907, 3517½ hours; and the time for the present year was to be 2562½ hours. These figures compared with 3571 hours lighting in Shipley. In view of the reduced times of lighting, the Shipley Gas Committee considered that an alteration in price was absolutely necessary; and they resolved that, on the revised table of lighting adopted in Baildon, the charge for gas be fixed at 3s. 4d. per 1000 cubic feet, subject to 4d. per 1000 feet discount if paid before Jan. 31 or July 31 in each year, but that the Baildon Council be informed that the charge will be reduced to 2s. 8d. per 1000 cubic feet net if the Shipley lighting table be adopted. The Committee's minutes were adopted by the Shipley Council; it being remarked that the proposal submitted to Baildon, that the price should be 2s. 8d. per 1000 cubic feet if the Shipley lighting table were accepted, embodied the terms on which the Gas Committee supplied gas to the Shipley Highways Committee for street lighting purposes.

RADIATORS



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LONDON, GLASGOW, FALKIRK.

Melbourne Metropolitan Gas Company.—The profits of this Company for the half year ending Dec. 31 amounted to £65,200. A dividend of 5s. per share has been declared for the six months, a sum of £22,500 added to the reserve fund, and a balance of £2600 carried forward.

Gas and Water Supply at the First Garden City.—At the annual meeting of the First Garden City, Limited, held last Thursday, under the presidency of Mr. Aneurin Williams, it was stated that at the time of the preceding annual meeting the population was 3000, whereas now it was nearly double. The factories which were being built a year ago were all at work, and four additional sites had been let; while the gas and water works both showed a profit.

Ancient and Modern Lighting.—At the Stockton Y.M.C.A. Rooms last Thursday, an instructive lecture was delivered by Mr. Matt. Dunn, the Assistant-Manager of the Stockton Gas-Works, on "Ancient and Modern Methods of Artificial Lighting," illustrated by experiments in gas manufacture and high-power lighting. At the commencement, the lecturer exhibited a number of ancient lamps, including one dug up in Tiberias, where for more than 2000 years it had been buried. Some interesting experiments in lighting were carried out, showing that the complaints usually made in regard to poor lights from incandescent lamps were due, among other causes, to deficient gas-jets, choked burner-tubes, badly constructed burners, and damaged mantles. Mr. Dunn's lecture was highly appreciated; and at the close he was accorded a hearty vote of thanks. The proceeds were devoted to the Stockton distress fund.

The Prepayment System at Maryport.—On behalf of the Local Government Board, Mr. M. K. North last Friday held an inquiry regarding an application of the Maryport Urban District Council for sanction to the borrowing of a sum of £1600 for the purposes of the gas undertaking. It was explained that the money desired was for the provision of prepayment gas-meters. The Clerk (Mr. F. Kelly) said that during the past five years, the Council had spent nearly £1500 in putting in meters of this class, with connections and internal fittings. The amount had been paid out of revenue; but owing to the increase in the price of coal, there was not likely to be any surplus revenue available this year. The Council had about 300 applications for meters; and the only possible way to satisfy the requirements would be by means of a loan. The Gas Manager (Mr. W. W. Morris) said the sum named would be sufficient to meet the charge for additional mains and meters. Up to date, £17,164 had been borrowed for the gas-works. The charge for gas was 3s. 4d. per 1000 cubic feet at Maryport, compared with 4s. at Whitehaven, and 2s. 6d. at Workington. Mr. Kelly remarked that the money would last for three years. There was no opposition to the application.

Slough Water-Works Purchase Question.—In the hope of arriving at a friendly settlement in the matter of the purchase of the Slough Water-Works, the Urban District Council have instructed their Clerk to address the following letter to the Company: "The Bill which is being promoted by my Council for the purchase of the undertaking of your Company has now been approved by the ratepayers, and will shortly come before Parliament. I am requested to again approach you with the object of ascertaining whether the Council and the Company cannot come to an amicable arrangement for the acquisition of the undertaking. Such an amicable arrangement has been clearly contemplated ever since the Company obtained their Act of 1875; and it is in the interests of both parties that the money of the shareholders and ratepayers should not be wasted in a parliamentary fight upon a question which was conceded so long ago. My Council are quite willing to depute a Committee to meet and confer with a Committee of your Board, with the object of discussing terms that shall be fair and satisfactory to both parties, so that the considerable expense of opposed parliamentary proceedings (should such opposition be contemplated by your Company) may be avoided."

Gas v. Electricity for Asylum Lighting.—A discussion took place at the meeting of the Cornwall Lunatic Asylum Committee recently upon the question of the lighting of the institution. The asylum has lately been greatly extended, and the new building is lighted by electricity, while in the older portion gas is the illuminant. Mr. Hodge suggested that the electric light should be used throughout the place, and said that as they already had the generating plant it was probable that a saving in cost would be effected. Mr. Lewis Foster pointed out that a great deal of the cooking was done by gas. The Steward (Mr. E. W. Sherbourne) suggested that meters should be put in to ascertain the quantity of gas used for cooking purposes. Mr. Hodge thought this was a very good suggestion; and he moved that it be carried out immediately, as it would enable them to ascertain the quantity of gas consumed by the stoves, and get an idea as to the comparative cost of gas and electricity. The annual expense of gas was about £700. The Chairman (Mr. Henry D. Foster) thought the gas bill was not so large as this. He said that if they were going to ask the County Council to find the money to extend the electric light to the old buildings, they would have to show that there would be a great saving in the cost as compared with gas. The initial outlay would certainly be considerable. Putting in separate meters for the cooking-stoves would result in a saving, because the charge for gas for this purpose was less than that for lighting. It was decided to fix separate meters.

The Directors of the South Staffordshire Water-Works Company have resolved (subject to the examination of the accounts by the Auditors) to transfer £2000 to the credit of the depreciation fund, and to recommend the declaration of a dividend for the six months ended Dec. 31, on the ordinary stock, at the rate of 7 per cent. per annum, less income-tax—carrying forward a balance of £7760 to the credit of next half year.

We learn that the Gas Department of Messrs. Bruce Peebles and Co., Limited, has, as from the 1st ult., been transferred to a private limited company, under the style of Messrs. Peebles and Co., Limited. There will be no change in the active management—Mr. Carmichael Peebles remaining Managing-Director, and Mr. George K. Grieve Manager, as formerly—while the address will also be as before, Tay Works, Bonnington, Edinburgh.

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The Town Clerk of Coventry has reported to the Gas Committee that the action brought against the Corporation by the Anti-Vibration Incandescent Lighting Company, Limited, for an alleged infringement of patent, has been dismissed with costs.

The Leigh-on-Sea Urban District Council have adopted a recommendation by the Gas Committee for additions and improvements to the gas-works; the estimated cost being £4000. The additions will include a retort-house, a coal-store, and a gasholder.

In compliance with a demand by members of the Labour party, who objected to the clause in the Stockport Corporation Bill relating to the construction of a railway in connection with the Kinder water-works, a poll took place last Friday, and resulted in a majority of 1394 in favour of the scheme.

We have received from the Pulsometer Engineering Company, Limited, of Reading, an abridged catalogue of their manufactures. It presents in a compact form a few general particulars, with illustrations, of their steam, centrifugal, turbine, and other pumps, filters, ice-making plants, &c.—the contents occupying 44 small pages.

Under the title of the "Taroads Syndicate, Limited," a Company has been formed with a capital of £2500, in £1 shares, to acquire any inventions or processes for the manufacture of liquid compounds for the treatment of road surfaces, and to carry on the business of contractors for the treatment of roads with tar and other liquids, &c. There will be no initial public issue.

At the London County Sessions a few days ago, Robert Williamson, 21, a labourer, pleaded guilty to stealing 15s. from a prepayment gas-meter, the property of the South Metropolitan Gas Company, in the house of his stepmother. It was proved that he had been many times convicted of stealing from these meters; and he was sentenced to three years' penal servitude.

It may be remembered that some months ago there were some changes in the Water Department of the Coventry Corporation; Mr. J. E. Swindlehurst, the City Engineer, being appointed Water Engineer. At the meeting of the Town Council last Tuesday, he presented his report on the matter, which was approved, and he was complimented upon his work in this connection.

"ILLUMINATING TRUTHS."

LEAFLETS FOR DISTRIBUTION.

No. 1.—"The Sanitary Aspects of Gas and Electric Lighting."
No. 2.—"The Cleanliness of Illuminants: The Eyesight."
No. 3.—"Fire Risks."
No. 4.—"The Relative Cost of Gas and Electricity, and Matters affecting it."
No. 5.—"On Reliability, with Instances of Misplaced Confidence."
No. 6.—"On Shop Lighting, with Special Reference to the Flame Arc Lamp."
No. 7.—"The Osram Lamp: Fiction and Fact."

This series of Leaflets will be useful, not only for distribution among Householders generally, but for circulation among Shareholders to fortify them with arguments in defence of the commodity in which they have invested capital. Copies of each Leaflet should also be kept in every Gas Undertaking's Show-Rooms.

Prices for Quantities on Application to WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

ENGINEER (TO ADVISE AS TO GAS-WORKS). Lisburn Urban District Council. Applications by Feb. 11.
WORKS MANAGER (TAR-WORKS). No. 4902.

Situations Wanted.

REPRESENTATIVE. No. 4869.
ASSISTANT TO ENGINEER, &c. No. 4903.

Agents Wanted.

WATER REPELLING PAINT. Lechler, Stuttgart.

Exhibition (July 18 to 24).

BUXTON. Plans, &c., from Hon. Secretaries, Electricity Works, Buxton.

Pupil Required. Firth Blakeley, Sons, and Co., Dewsbury.

Patent, Share for Disposal. Gas Heating Apparatus. No. 4904.

Plant, &c., for Sale.

CENTRE VALVE. Waterside Mill, Hadfield.
ENGINE, EXHAUSTER, &c. Barrhead Gas-Works.
STATION METER. Cowes Gas Department.

Plant, &c., Wanted.

STATION METER. Cowes Gas Department.

Company Meetings.

BRENTFORD GAS COMPANY. St. Ermin's Hotel. Feb. 14, Two o'clock.
BROMLEY GAS CONSUMERS' COMPANY. Bromley. Feb. 11, Six o'clock.
HORNSEY GAS COMPANY. London Office. Feb. 21. 3.30 o'clock.
NORTH MIDDLESEX GAS COMPANY. London Office. Feb. 26, 2.30 o'clock.
SOUTHGATE GAS COMPANY. London Office. Feb. 20, 3.45 o'clock.
SOUTH SUBURBAN GAS COMPANY. De Keyser's Hotel. Feb. 21, Three o'clock.
WEST HAM GAS COMPANY. Liverpool Street Hotel. Feb. 25, 12.30 o'clock.

Stocks and Shares.

LOWESTOFT WATER AND GAS COMPANY. Feb. 25.
SOUTH ESSEX WATER COMPANY. Feb. 25.
SUNDERLAND AND SOUTH SHIELDS WATER COMPANY. Feb. 20.

TENDERS FOR

Brass Cocks, Ironmongery, &c.

BARROW-IN-FURNESS CORPORATION. Tenders by Feb. 11.

Coal and Cannel.

FENTON GAS DEPARTMENT. Tenders by Feb. 13.
MILFORD HAVEN URBAN DISTRICT COUNCIL. Tenders by Feb. 15 and 17.

Cookers.

BARROW-IN-FURNESS CORPORATION. Tenders by Feb. 11.

Fire-Clay Goods.

BARROW-IN-FURNESS CORPORATION. Tenders by Feb. 11.

Gasholder, &c.

MANCHESTER GAS DEPARTMENT. Tenders by Feb. 27.

Lime.

BARROW-IN-FURNESS CORPORATION. Tenders by Feb. 11.
SALFORD GAS DEPARTMENT. Tenders by Feb. 13.

Meters.

BARROW-IN-FURNESS CORPORATION. Tenders by Feb. 11.
COWES GAS DEPARTMENT.

Oil.

BARROW-IN-FURNESS CORPORATION. Tenders by Feb. 11.

Pipe Laying, &c.

SELSEY WATER COMPANY.

Pipes, &c.

BARROW-IN-FURNESS CORPORATION. Tenders by Feb. 11.
LEEK GAS DEPARTMENT. Tenders by Feb. 14.

Sulphate Plant, &c.

DUNDEE GAS COMMISSIONERS. Tenders by Feb. 17.

Sulphuric Acid.

BARROW-IN-FURNESS CORPORATION. Tenders by Feb. 11.

Tar.

ABERGAVENNY GAS DEPARTMENT. Tenders by Feb. 13.
BARROW-IN-FURNESS CORPORATION. Tenders by Feb. 11.
LINCOLN GAS DEPARTMENT. Tenders by Feb. 17.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

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All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
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